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The Ichabod Spencer Lectures
Delivered at Union College
1911

CHAPTERS FROM MODERN PSYCHOLOGY

JAMES R. ANGELL

Through the generosity of MRS. KATHERINE SPENCER LEAVITT *a foundation has been established upon which eight lectures in Psychology are to be delivered each year at Union College.*

This lectureship is endowed in memory of her father, the Rev. Ichabod Spencer, D.D., a graduate of Union College, of the class of 1822, and is to be known as the Ichabod Spencer Lectureship in Psychology.

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CHAPTERS FROM MODERN PSYCHOLOGY

BY

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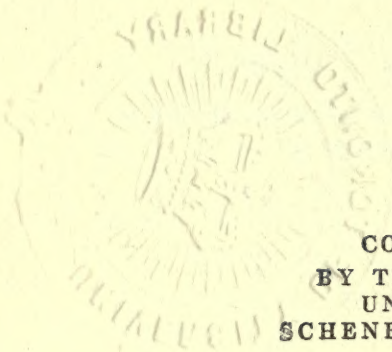

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PREFACE

THE present volume contains the first series of lectures delivered upon the Ichabod Spencer Foundation at Union College, during the early part of the year 1911.

It was the desire of the founder, Mrs. William Leavitt, to do honor to the memory of her father, the Rev. Ichabod Spencer, D.D., of the class of 1822 at Union College. She wished also to encourage the study of a branch of knowledge in which he was deeply interested and well skilled. It was specified, therefore, that the lectures should deal primarily with psychological subjects.

It seemed to the author, who was honored by selection for this agreeable task, that the opening course might properly deal in an introductory manner with the main characteristics of the contemporary situation in psychology, leaving to subsequent lecturers the more intensive consideration of one or

another of the problems now engaging the attention of specialists. He has carried out this plan as completely as he could within the limits of the eight lectures of the series.

The material was arranged for presentation to a general college audience, and has, therefore, been freed as far as possible from the technicalities of scientific terminology. The attempt has been made to convey a just and comprehensive impression of the principal features of the psychology of to-day; but much selection among topics has been necessary, and this has been guided by a purpose to avoid the more abstruse aspects of the subject which are somewhat remote from the usual interests of the layman.

J. R. A.

CONTENTS

CHAPTER		PAGE
	PREFACE	v
I.	GENERAL PSYCHOLOGY	1
II.	PHYSIOLOGICAL PSYCHOLOGY	43
III.	EXPERIMENTAL PSYCHOLOGY	73
IV.	ABNORMAL PSYCHOLOGY	117
V.	INDIVIDUAL AND APPLIED PSYCHOLOGY	153
VI.	SOCIAL AND RACIAL PSYCHOLOGY	195
VII.	ANIMAL PSYCHOLOGY	239
VIII.	GENERAL GENETIC PSYCHOLOGY AND RETROSPECT	271
	APPENDIX — BIBLIOGRAPHY	305

LECTURE I

GENERAL PSYCHOLOGY

CHAPTERS FROM MODERN PSYCHOLOGY

LECTURE I

GENERAL PSYCHOLOGY

TO the cloistered student of a generation ago, the demands laid upon psychology to-day by the market and the forum, by the physician and the priest, by the philosopher and the pedagogue, would have seemed wholly unintelligible. In those golden days the study of the mind was the quiet business of the sober recluse and a matter of supreme unimportance to the world at large. To-day the shrill cry for the practically useful has penetrated to every corner of the intellectual universe, and psychology in common with all the other sciences has been laid under contribution. The salesman and the merchant demand a knowledge of the principles whereby the mind of the possible purchaser may be brought into a

mood responsive to the lure of their wares. The lawyer and the judge have asked for methods with which more efficiently to estimate the veracity of testimony. The physician and the priest look to psychological methods for the cure of sick souls and ailing minds. The philosopher in his search for light upon the meaning and worth of human conduct, turns to psychology for an account of the will, while the schoolmaster, striving to "teach the young idea how to shoot," levies constant tribute upon the psychologist, not only for facts concerning mental growth, but also for methods wherewith to ascertain and evaluate the results of his own pedagogical procedure.

In view of all this eager call for his services, it is no great wonder if the psychologist has come to estimate his own importance at too high a figure. Time, however, may be trusted to do his perfect work in restoring any such loss of equilibrium.

Meantime, it is clear that a successful response to appeals such as these we have cited requires, as a preliminary measure, a

thorough scientific survey of the principles of mental activity and organization. Solid and enduring achievement can rest on no other foundation. With the fruits of this general survey at our disposal we shall be in a position to secure the intelligent application of our psychological facts and principles to the needs of practical life, just as the scientific facts and theories of electricity have been fitted to the needs of telegraphy, telephony, and illumination. Psychologists are now at work the world over, attempting to carry to completion the two great divisions of this programme.

In this course of lectures the exigencies of time prevent our entering fully upon either the theoretical or the practical aspects of the subject, but our attention will be fixed primarily upon the former. We shall examine the means by which the essential attributes of the mind have been determined, and shall scrutinize briefly the more important of them. We shall inquire how the mind is connected with the body, a problem that physiological psychology has made its own.

We shall discuss certain of the abnormalities of mental experience, such, for instance, as hypnosis. The world of the animal mind will be passed in review, and the general features of mental evolution, both in man and beast, will receive notice. In one chapter we shall turn briefly to a few of the applications of psychology to practical affairs.

Despite its abundant and obvious youth, psychology has already differentiated itself into a considerable number of separate fields, each one claiming the exclusive services of the expert. We shall accordingly find our topic divided for us on lines which we can follow almost unguided.

Our first steps may well be directed to a consideration of the more elementary teachings of *general psychology*, from which spring all the various branches of the psychological tree. This done, we may proceed to an account of the more important sub-divisions of psychological science as these are organized to-day.

The reader may well be warned that we plunge at once into the most technical part

of our undertaking and pursue for a time analyses which many healthy persons find inexpressibly dreary. If his patience survive the opening lecture or two, he is likely to find the materials of the remaining ones more pertinent to common human interests. Indeed, there is nothing to prevent his reading the later lectures first. The conditions under which the course was given required that each lecture be essentially complete in itself and intelligible without regard to its predecessors.

Every science is under obligation to analyze the phenomena with which it deals. Accordingly the first business of general psychology is to unravel the tangled skein of mental life and trace each of the strands to its source. Common experience presents us with complicated mental states, such as memory, emotions, acts of will, and the like. These must be analyzed and dissected until the secrets of their composition are laid bare. Through the persistent and oft-repeated efforts of many trained observers, the rudimentary facts about mental constitution have

been reasonably well made out, although here, as elsewhere in science, there is at some points conspicuous absence of unanimity in expert opinion.

After it has made its peace with the elements of the mind, general psychology proceeds to an exhaustive examination of the other phenomena of normal consciousness, attempting to determine the composition of each and its modes of behavior. The finished work is in the nature of a portrait of the normal mind, accompanied, where possible, by an explanation of its varied activities.

It will be seen upon reflection that there are at least two main ways in which mental life might be resolved into elements, or classified into phenomena, resembling one another. One might expect that if the classifications reached by the two methods were fundamentally sound, they would at least not conflict with one another, whether they chanced to coincide precisely or not. Such is substantially the case.

One of these methods consists in remark-

ing the disturbances in mental life which occur under conditions of disease and which throw into relief one or another property of our mental equipment. Such a procedure brings to notice the difference between sensation and intellect, the distinction of emotion from either, and the differentiation of volition from all three. There are, for example, familiar instances of nervous disorders in which sensation is affected, while other mental characteristics remain essentially unchanged. Certain diseases of the spinal cord may thus result in the extreme dulling of sensations of contact, even to the point of obliteration. Again, diseases of the retina or of some of the central portions of the optic nervous pathway may result in blindness to a part of the field of view. In such cases as these there may be little or no obvious disturbance of the other activities of the mind. Reason may be unclouded and emotion unperturbed.

Contrasted with this are the cases in which intelligence is disordered, as when, in dementia, the subject is unable to recognize the most

familiar objects presented to him, although he is in no sense blind, or deaf, or in any other way anæsthetic. All sorts of disorders of memory are encountered — loss of memory for names, for faces, for music, for the occurrences of particular periods of time, etc. Again, the subject may possess substantially perfect powers of recognizing the objects in the world about him, but the inferences which he bases upon these objects may be entirely fanciful and erroneous. This is the field of delusional insanity. Contrasted with both of these types of cases are those in which sensation is essentially normal, the processes of inference are substantially intact; and still the patient finds it impossible to re-act in a normal way. In some instances he suffers from a flighty instability of conduct, acting instantly upon every idea which enters his mind. In other cases decisions seem impossible for him to make, and the efficiency of his actions is crippled by his hesitation and procrastination. There may be, in any or all of these several forms of mental defect, an accompanying disturbance

of the emotional life. Indeed, this is almost certain to be true. But, on the other hand, there are some forms of mental disease in which the derangement of the emotional life is at the outset much more striking than any disturbance in the intellect or in the field of sensations. Profound depression may thus be the earliest symptom of mental disorder.

Were one to base a classification of mental processes upon considerations like these just passed in review, one would evidently have to recognize sensation as a distinct form of mental action, intellect and memory as another, will as a third, and possibly emotion as a fourth.

The other point of departure from which a classification might obviously be executed, is that of the immediate analysis of one's own consciousness, with a view to determining the simplest forms of mind and grouping together such elements in this survey as may seemingly have common properties. As a matter of fact, this is the method which has commonly prevailed in the history of psychology. It has resulted in a considerable

number of divergent classifications which we can hardly pause to examine minutely. We may, however, point out a few of the main tendencies in such analyses. It may be said at the outset that this method of work has often leaned toward an over-emphasis upon the facts of mental structure and substance, at the expense of adequate analyses of mental behavior. The mind has been regarded too exclusively on the analogy of the chemical compound which is to be resolved into its elements, and too little as an expression of life to be studied in its activities. The details of the matter are certain to strike the average reader as peculiarly arid and devoid of bearing on the vital aspects of the mind, so that we shall treat the subject very briefly despite its scientific importance.

A certain group of psychologists recognizes one, and only one, basic form of mind stuff, one kind of material of which the mind is composed: to wit, sensation. They admit that within the range of sensation there are many shades of difference; blue and green, as sensations, are radically distinct from

sour and salt, and no one of them, taken alone, would ever suggest tone or noise. Nevertheless, regarded in their entirety, these sense qualities give us a variety of elementary experiences, each possessing certain common psychological properties, and each like the other in its dependence upon certain bodily structures, called sense-organs. Out of such materials, these authorities maintain, all our mental life is formed.

To the ordinary individual this position appeals in only one particular; namely, its simplicity. To say that the feeling of gratitude, or of reverence, or of love, can be regarded as in any sense a derivative of sensation; or that a process of reasoning upon some abstruse problem is such a derivative, and especially to hold that the will is merely a product of sense activities, seems altogether forced and unconvincing. Few psychologists have ever held the view in this naïve form, although many of them believe that sensation is in a peculiar sense the fundamental stuff from which the mind has evolved; but they recognize that, in the course of the

development, many features have appeared which are quite distinct from sensation.

Another group of psychologists would add to the list of mental qualities certain ones which they designate simple feelings. The experience of pleasure may illustrate this group of alleged elements. A sensation or an idea, it is urged, may be either agreeable or disagreeable, and the agreeableness is something quite distinct, — equally elemental and equally unique with the sensation or idea. Again, as in the case of sensation, there *may* be many varieties of these feelings, although important authors have admitted only the two we have mentioned. Certainly, disagreeableness is as different from agreeableness as one thing can readily be from another. One can hardly be reduced to the other.

Still another group of authorities recognize, in addition to these two rudimentary forms of the mind, i.e., sensation and simple feeling, a third form which they call the image or sometimes the idea. By the image in distinction from the sensation they mean

to indicate that kind of experience which we have when we close our eyes and get a mental picture of the object at which we were looking a few moments ago, or when we hear again in imagination the stroke of the bell which has just sounded the hour. Any sensations may be thus reinstated, although there is the greatest diversity in the ease with which they recur. Imagery, like that of dreams, often seems to present scenes which are quite strange to us. Images, it is alleged, are similar to sensations in many particulars; for instance, they embody the same qualities of color, tone, or what not, but they are also different in certain essential respects. For example, we can control the one much better than the other, so that we must recognize a class of mental elements significant for intellect and different from sensations.

In all these instances the search is evidently for the primitive, or the simple, or the unanalyzable, the sort of thing for the most part alien to common experience, least stimulating to the imagination, and least

relevant to ordinary interests. The psychologist is seeking these elements because he wants to know how the composite forms of mind are made up, and what the materials are that enter into them.

Perhaps the most familiar of the classifications is that which divides mental life into knowledge, feeling, and will. In this case, knowledge includes not only sensations and images, but also memory, conception, judgment, reasoning, and the like. Feeling involves the essentially subjective aspect of our experience. It reflects our personal attitude and is represented by such mental processes as pleasure and displeasure.

Thanks, perhaps, to certain legal, ethical, and theological prepossessions, the will seems to untechnical persons to be about as obvious a property of the mind as any other, but it can hardly have escaped notice that only in the last classification is it mentioned among the conscious elements. This fact must not be interpreted to mean that psychologists in general are skeptical of the existence of anything corresponding to

the will of common belief, but simply that they are unable, for the most part, to discern any special mental *element*, like that of sensation, which corresponds to the will. For most of them, will is a term applying to certain *forms* of mental *action*, and not a term designating a particular kind of mental *stuff*, as does the term sensation. It is as though in political affairs one recognized the fact of government, while denying that any one person embodied the governing function exclusively in himself.

From considerations such as these canvassed in the last few paragraphs, one might obtain a somewhat depressing impression of lack of uniformity and agreement regarding the fundamental attributes of the mind; but the importance of this fact should not be over-emphasized nor misapprehended. It finds its counterpart in the failure among physical and chemical scientists in the past to agree with perfect unanimity upon the elementary aspects of the physical world. Time will cure this difficulty. Moreover, its practical bearings are much less serious than

might be supposed. In particular it will probably have been observed that no one of the classifications quoted under the heading of introspectively derived groupings, corresponds forthwith with the divisions suggested by the more familiar forms of mental disturbance. To be sure, we might have cited certain classifications which correspond much more closely, but they are not of a kind at present dominant. The search for the simple, the uncompounded, is just now the fashion, and the disorders of the mind do not often lend themselves to description in such terms. Disturbances of memory, of emotion, of will, of reasoning, all involve highly complex mental activities, not simple ones. On the other hand, the two types of classification are supplementary, rather than contradictory, to one another, and the discrepancies are not really significant.

One thing emerges from all the classifications as a point of universal agreement, namely, that sensation is in some way a rudimentary form of conscious experience. Similarly it may be said that feeling, which

in its complex embodiments is essentially synonymous with emotion, is another basal phase of mental life. It is universally regarded either as primitive and elemental, or as a form of sensation which is itself simple. Even those authors who would rank feeling as an undeveloped form of sensation, recognize that it possesses certain peculiarities which mark it off from the latter in an unmistakable way.

The main lines of divergence concern, then, (1) the question whether ideas and images really differ from sensations in a radical fashion, or are simply derivatives from them; and (2) whether will deserves recognition as a primal and simple form of mental life. These two points of debate touch matters which belong to the niceties of psychological analysis, rather than to the fundamentally important articles of faith. One might adopt either view without prejudice to a satisfactory understanding of the mind. As was intimated a few lines above, psychologists who deny the reality of any mental element corresponding to the will, are by

no means attacking the reality of voluntary action. They are simply insisting that our knowledge of volition does not come to us through the presence in consciousness of an element comparable with sensation. It is to be remembered, moreover, that although at present few in number, there are still psychologists who adhere to belief in the presence of such an element, to which they often apply the term conation.

The search for the elements of mental experience inevitably involves an examination of all the forms and stages of consciousness. Perception, memory, imagination, reasoning, emotion, and acts of will, are all sure to have been studied. Nevertheless, after this quest has been concluded, the psychologist returns to determine more carefully the salient characteristics of each of these phenomena and its relations to the other forms of mental activity. Thus little by little he elaborates his description of the mind as a whole. Thanks to the labors of many generations of psychologists, we are now in possession of a large amount of well-

established facts and highly systematized theory, to certain phases of which we may next address ourselves.

What, then, are the general lineaments of the human mind as revealed in the portrait which modern psychology offers us? Its bolder features may be portrayed with some success, even if the details are necessarily left in shadow. A description couched in genetic terms will, perhaps, afford us the readiest and most vivid impressions. It will take us at once to a consideration of the beginnings of mental life, to the psychologically primitive in the process of growth, rather than to the elementary in structure, with which we have mainly dealt hitherto. Instinct will occupy our attention instead of sensation.

In the first place, the conception of the mind as a spiritual entity born into the world with perfect innocence, the "trailing clouds of glory" hypothesis, is not at all in keeping with the facts which modern biology and psychology present, provided this notion be taken to mean that the mind has no inherent

predispositions. The mind, so far from appearing on the scene devoid of all specific traits, comes into being with certain perfectly definite tendencies already stamped into its every fibre. These tendencies come to light in the form which we know as instinct, i.e., traits common to the entire race. They find their physical counterparts and their physiological foundation in the reflex activities of the nervous system. These instincts are, to be sure, in no sense perfectly rigid dispositions to action. They present a very large degree of flexibility, but they are, for all that, none the less predetermined and none the less the basis of inclinations and prejudices which color the entire conscious life from birth to death. In later lectures we shall have occasion to see how certain of these instincts give texture to the very fabric of society itself, and how cardinal they are in all animal behavior.

Despite the fact that we are familiar in a practical way with the manifestations of instincts, especially such as are connected with our emotions, we rarely recognize in

any adequate manner the essentially innate character of these and many other of our human qualities. To be sure, we are entirely cognizant of the fact that each of us possesses individual and unique tastes and interests. But we are often oblivious to the further fact that many of these tastes are indigenous, having declared themselves long before experience has had opportunity to teach us her sophisticated lessons. A few illustrations will serve to clarify the points under discussion.[1]

Whenever we give way unreflectively to an impulse of fear, or an impulse of anger, whenever we are irrepressibly attracted by some moving object in the outer ranges of our field of view, whenever we find ourselves absorbed in the conduct of other individuals when we might equally well have been observing the actions of inanimate objects,

[1] The reader will not misinterpret these statements as constituting a rejuvenation of the mediæval notion of innate ideas, i.e., the doctrine that the mind is in possession of certain items of knowledge at birth. This conception has rested quietly in the grave for several centuries and ought not to be disturbed.

in each and all of these cases we are responding to springs which lie as deep in our nature as the origin of the human species. Reactions of this character, we have come to believe, are based upon the transmission from generation to generation of modifications in the nervous system, which have led to types of conduct that throughout the ages have been fundamentally beneficial to human life. In the case of the lower animals, it is sometimes assumed that these traits are confined to their expression in neuro-muscular action and that they are not conscious; but in the human being, although they equally have their foundation in the nervous system, they lead to profound alterations in mental experience. Instincts are accordingly not only phenomena of a physiological kind, they also implicate the basic activities of mind.

To undertake at this point an exhaustive catalogue of every form of instinctive expression found in human beings, would be a long and somewhat futile task. In a general way, it may be said that all the common and persistent human interests, all the fundamental

forms of human desire, all the more profound types of human emotions, are based upon the life of instinct. One has only to recall the part played in man's experience by such motives as love and hate, grief and despair, anger and fear, ambition and envy, to realize how profound are the sources from which these impulses take their rise, how essentially native and untaught are the reactions which one makes in response to such incentives, how utterly contrasted are all such experiences with the more cold-blooded and deliberate activities involved in much of human conduct.

Over against these innate impulses which are found to be common to all mankind and whose racial origin is thus betrayed, stand a group of tendencies to action which are oftentimes as compelling in their nature, but which are of a different origin. Here belong the purely individualistic tastes, capacities, and interests, which mark off man from man as distinctly as the instincts unite one to another. Take, for example, the dominating interest which musicians feel for

music. To be sure, there is in a certain sense a very wide-spread, if not universal, tendency to respond to rhythmical and melodious stimulations of sound. But there are many individuals with whom this appeal is essentially powerless, and even with those who are responsive, there is no such preponderating enthusiasm, no such complete absorption, no such capacity for the virtuoso's production, as characterizes the true musician. Again, the painter represents a type of absorption in a limited range of human experience which marks him off in the most radical way from the ordinary individual. In both these cases and in dozens of others of similar stripe, we are confronted with a natural mental bias, with a native intellectual and emotional capacity, which may determine the most important and vital decisions of life. The impulses which thus find expression are in no proper sense racial. In calling them *individualistic* we may be stating the entire fact so far as we know it, inasmuch as we may discover no ancestral traits which adequately explain the phenomena. On the

other hand, we come repeatedly upon genealogical evidence indicating that qualities of this character may be inherent in a certain family stock, and in such a case we speak unhesitatingly of the influences of heredity.

So far as concerns our general conception of the character of mind, it is a matter of no great consequence whether these more individualistic impulses are to be explained in one way or another. For present purposes, the important consideration is that the mind of the newborn child comes into the world already inspired with tendencies to feeling, thought, and action, which create from the outset a matrix of dominating impulses, determining from the very first the kind of mentality which the adult individual is later to possess. This statement is made with no intentional disregard of the influence which environment, both physical and social, is certain to exercise upon the growing mind. Influences of this character are, of course, of superlative importance. But they are brought to bear on no virgin soil. They direct their forces upon a mind already pos-

sessed of innate preferences and prejudices that will go far to determine what elements in the environment may prove of significance. The truth of this doctrine is illustrated unmistakably in every large family of children. No matter how uniform the conditions of life surrounding the successive children, it is the most familiar of all observations that they are likely to differ from one another in amazing ways. These differences can have no adequate explanation which does not take account of the variations in native capacity, taste, and interest, which are incidents of the varieties of the human organism.

However divergent, then, the sources from which our native impulses flow, modern psychology teaches without reservation that our volitional life, our conduct and our character, are built up around these factors as a centre. Voluntary action does not take place without adequate motive. And the motives, not only for each individual act, but for the general series of acts which, taken in their entirety, constitute our rational

conduct — these one and all are found in the final analysis resting upon impulses of the character we have just described. The change which comes about as infancy gives way to adolescence, and this in turn to maturity, involves no radical alteration of principle. It is a progressive development, from conditions in which these impulses are very simple and immediate in their operations, to conditions in which they become complicated and modified by the effects of experience. The only qualification of an essential character which this statement requires concerns the recognition that certain types of impulse, such as those of sex for instance, appear later in life than do others, although they are none the less instinctive and untaught. Indeed, there is good reason to believe that many of our instinctive traits come to their full fruition only after a considerable amount of experience. Thus the feeling which we call sympathy has certainly an instinctive basis, but it can hardly exist in its fullest development until experience has furnished us with stores of knowledge

adequate to the appreciation of the various experiences of others.

No sooner does the young organism make its appearance upon the scene than it is assailed by stimulations of all sorts which fall upon its sense organs, produce sensations, and incite it to motor responses of the most various kinds. Certain of these responses are of the type already referred to as reflex and instinctive acts. Others appear as merely random movements of the various muscles of the body. Of the first kind are the sucking movements brought about by contact sensations from the lips. Of the second kind are the aimless and undirected movements of the arm, leg, and face muscles. It should also be remarked that the sense organs, upon which fall the stimulations of the physical world, are, at birth, in very diverse conditions of readiness to react. Thus the nerves of the skin which mediate sensations of contact, temperature, and pain, are substantially perfect in their mode of operation from the outset. On the other hand, hearing is ordinarily very defective for a

week or two after birth, owing to the presence of unabsorbed fluids in the middle ear. Vision is also highly imperfect and commonly remains in this condition for several weeks. This defect is chiefly due to the imperfect manner in which the muscles operate that control the movements of the eye.

The mind awakens, therefore, to a situation in which muscular activities are already in full swing. It finds its principal task concerned with the introduction of order and purpose into these movements. What we call conduct in the mature individual is simply the sum total of such controlled activities.

In achieving this control a number of mental factors are immediately called into play. The sensations which are brought about by the mere presence of light, sound, odors, and so on, have already been mentioned. In addition to these, however, we meet from the first with the reinforcing or inhibiting effects of pleasure and pain, which tend to encourage certain types of reaction, and to eliminate certain others. This tendency

is commonly rendered effective through the operation of memory, which so acts that, when one feels a tendency to respond to a stimulus which has already been experienced, there is brought into action the recollection of the results of our previous reaction to the stimulus. Thus it comes to pass that, from the earliest moment of conscious life, memory is forcing upon us the lessons of experience which are, in the first instance at least, taught to us in terms of pleasure and pain.

Taken literally, however, memory is always a backward looking process, a retrospective type of action; and the important fact about the control of our activities, when we have reached such a stage of maturity as to enable a confident detection of our own conscious processes, is that we find ourselves looking forward, employing prospective and speculative activities. Of course, it may be held that in a very just sense such indulgence in "futures" is always carried out on the basis of our remembrance of past experience. Without challenging the truth of this

assertion, it may nevertheless be insisted that there is a very real distinction between the use of our memory capacities, simply to recall the past, and the use of our imagination to forecast the future and therewith to control our own action.

Imagination is by no means confined to the purely concrete and practical uses which this description suggests, nor is it intended to slur the significance which it possesses in the realms of literature and art. Indeed, there are few more suggestive hypotheses in present day psychology than that which connects artistic productivity with the phenomena of play and thereby unites, under a single psychological principle, the processes whereby the little child gives free vent to his own individual impulses, and that by means of which the mature artist, or the skilled craftsmen, embodies for us in some tangible work of art the spontaneous outpouring of his spirit. Imagination is accordingly to be viewed, not only as the process whereby the ordinary practical affairs of life are guided, in so far as they require

foresight, but as also the medium through which most of the world's finer types of happiness are brought to pass.

Reasoning processes, in the ordinary sense of the term, are not commonly attributed to the human infant, and this conservatism in popular usage is justified in so far as it implies that the reflective processes of the young child, when compared with those of the adult, are extremely simple and crude. But the point is not well taken, if it be interpreted to mean that the infant mind is at the beginning devoid of reasoning capacities and that at some later stage these capacities suddenly emerge. The fact is that the term "reasoning" covers a wide range of mental acts, involving at one extreme so simple a process as the apprehending of similarity between two objects or two thoughts, and at the other extreme the highly complex operations by which a mathematician proceeds from a group of premises to draw a given number of closely reasoned consequences.

All the mental equipment thus far described finds its primary significance in the

activities of adjustment to physical and social environment. At the outset of infant life, the focus of activity is almost entirely confined to the vegetative processes upon which is most immediately dependent the maintenance of life. At a little later period control is gradually gained over the movements of locomotion, and the individual begins to attain some independence in his capacity to determine with what particular facts in the environment he shall come into contact. Contemporaneously with this development, there begins to evolve a social consciousness in connection with reactions which are designed to assist in satisfactorily adapting the child to social circumstances. The major significance of our educative processes is found at this point, and partly by imitation, partly by thoughtfully directed conduct, the individual learns how to fit himself to the needs of the social and physical surroundings amid which he has to live.

From the very beginning of this process of adjustment to the world of physical nature and to the presence of other human beings,

there is operative the strong and persistent influence of feeling, emotion, and desire. As we have already indicated, the earliest sensory stimuli which fall upon the organism are by no means indifferent, but come freighted with pleasure or with pain. Similarly, and in even more important measure, the later experiences of life present situations in which are profoundly stirred the instinctive and emotional impulses to which reference has been made at an earlier point. It is a conviction of common sense, which finds abundant confirmation in the studies of psychologists, that we live in no cold and neutral mental world, but rather in a world where warm feeling and resistless impulses war with one another for the control of human conduct. Though the white light of reason burn never so purely, it produces of itself no generative heat adequate to set in motion the springs of our conduct. For this is required the high temperature of desire, of aversion, of general emotional excitement.

Socrates taught that right action was

conditioned solely upon right vision. Psychology would admit that negatively this statement is true. Certainly, right conduct cannot be secured without accurate vision, without true insight into the full meaning of the facts involved. But, on the other hand, right conduct is likely to remain *no* conduct, unless at some point in the process incentive is given in the form of active emotional interest in one line of action, as contrasted with another.

On the other hand, Hedonists of all schools have repeatedly alleged that action takes place only in response to incentives of pleasure and pain. The psychological accuracy of this statement, too, may well be challenged. It certainly seems to be a fact that our choice of one line of conduct rather than another, however well founded it may be in logic, carries with it, in order to secure its actual execution, some element of appeal to our feelings, our interests, or our emotions. Particularly is this true of all those crucial forms of decision which have to do with the crises in our lives and in general

with the more important proceedings of every kind. Conceivably, one may decide on a given day to wear one necktie rather than another, by virtue of the mere accident as to which one chances to be within reach. In such a case, the element of feeling will certainly be at a minimum. On the other hand, it is scarcely conceivable that one should decide on the choice of a wife without some considerable emotional excitement entering into the decision. It does not appear, however, that pleasure and pain figure as the sole, or even the major, motives in consciousness. Certainly the decisions made in the course of our daily routine disclose no such reference to them.

As has been previously pointed out, the earliest objects of our volition are undoubtedly the satisfactions of the simple bodily needs represented by hunger and protection from the extremes of temperature. Then comes interest in securing control over objects at a distance from us by virtue of learning to move our eyes, our hands and our bodies in such ways as will enable us to secure or to

avoid particular forms of stimulation. In this manner, it occurs that during the very early years of life we gain command over our more commonly used muscles. We learn to walk, and to talk, to write, and to read, to reach for objects, to lift them, and to place them where we may desire. All these muscular accomplishments rest upon what we designate habits. These habits at the outset require the most persistent and careful mental control. After the movements have been performed a few times, they tend to become more or less automatic, and after a sufficient number of repetitions, they may pass almost wholly out from under the direct guidance of the mind and be carried on by the automatic machinery of the nervous system, thus leaving the mind free to pursue its own further interests.

In point of fact, in pursuing these interests, constant use is made by the mind of precisely these same habits. Upon them it relies for the execution of its own purposes. Thus, to illustrate, one may be engaged on a mathematical problem which involves the use of

written figures. In childhood, these figures had to be painstakingly formed. Now it is sufficient merely to fix one's attention upon the problem in hand, in order to have the pencil execute the necessary movements almost without consciousness. In the same way, when one has decided on a given course of action, for example, the sale of a piece of property, the automatic habits of the body carry out the mental behest, either in the form of spoken or written words. Thus it appears that the automatized control over the muscular co-ordinations, which we call habit, is an indispensable incident in the realization of our decisions.

It only remains to add that an inspection of all the relevant facts leads to the conviction that in a true sense our entire volitional activity consists in the building up of more and more inclusive habits. Habits like those of enunciation, reading, and walking, may seem at first thought to be quite independent of one another. Certainly, each has been learned in a measure of independence from the others. But almost any business trans-

action requires combining the three in perfectly definite ways in order to secure practical results. Moreover, in the routine of any professional or business occupation, such separate habits as these come to be combined in fairly systematic ways. During adult life, in any event, much of our growth consists in this modification and re-combination of elementary habits which we have acquired at some earlier period. Of course, one must recognize the fact that in early life we frequently take on co-ordinations which are to all intents and purposes entirely new. But most of us quickly reach a limit in this type of acquirement, and from that time on our progress is largely of the other variety already described, i.e., a directing of our old habits to new ends.

The foregoing account gives at best but an imperfect impression of the multifarious ways in which the energies of general psychology are engaged. It delves into myriad details whose characteristics have hardly been suggested. It expands into far-reaching hypoth-

eses to which it has been impossible even to allude. Not content with its own private resources, it levies for its supplies upon every other branch of psychology. To a survey of certain of these dependencies we shall now give our attention.

LECTURE II

PHYSIOLOGICAL PSYCHOLOGY

LECTURE II

PHYSIOLOGICAL PSYCHOLOGY

THE development of physiological psychology is one of the things most definitely characteristic of modern conditions in the study of the mind, and we may well give it our early attention, as serving to put us in touch with the scientific temper of the time. It finds its main business in a study of consciousness in its connection with the physical body. Our first inquiry will concern the evidence that mind and body are actually inter-related. We may then proceed to examine in some detail the character and limitations of the connection.

It is a matter of common knowledge that the fate of the mind is bound up with the experiences of the physical body. This information is based in part upon such occurrences as those in which mental processes are disturbed by blows, or by drugs, or by other

physical agencies of the same external sort. A cup of coffee, a glass of wine, or a satisfying meal, are any of them likely to produce a certain exhilaration of the spirit which common sense attributes unhesitatingly to the alterations occasioned by these several media in the physical organism. Drugs of various sorts, such as opium or hasheesh, occasion disturbances in the flow of thought, ranging from the appearance of phantasms like those of dreams, up to more serious and profound alterations, eventuating in the obliteration or the suspense of consciousness.

In a similar manner, common-sense prejudice has come to locate the mind in the brain, or at least in the head. Blows upon other portions of the body are likely to occasion pain which, if sufficiently intense, may threaten the continuity of mental processes. But this interruption to the life of the mind is much more regular and much more frequent in the case of severe blows upon the head. Wounds, if sufficiently severe, and when accompanied by extreme loss of blood, are sure seriously to interfere with our mental processes, and if

the drain be long continued, consciousness is snuffed out.

To be sure, there is in the face of all this common-sense evidence a certain small fraction of our modern occidental communities, which stoutly clings, as do many Orientals, to belief in the entire independence of the mind from the body, urging the essential freedom of the human spirit from all forms of physical bondage. But this constituency has never succeeded, and doubtless never will succeed, in propagating its doctrine in any such way as to bring conviction to the rank and file of plain people. Certainly the ordinary belief is that which we have already described.

These prejudices of common sense are abundantly supported by the deliverances of modern science, and fortified at scores of points by convincing detail which common experience is powerless to supply. In the building up of the scientific evidence bearing on this matter, several distinct sciences converge to teach a common doctrine. Experimental physiology, human and comparative

anatomy, and physiological psychology, all combine with the teachings of pathology to give us the modern doctrine of the connection of mind with brain. It will be convenient in summarizing certain of the lines of evidence offered by these several departments of science, to disregard the chronological order of development and to arrange the facts with reference primarily to economy of time and the exigencies of our present interest.

Comparative anatomy reveals to us the history of the development of the nervous system throughout the ranges of animal life. It shows us at one end of the line organisms of amazing structural simplicity, like the unicellular amœba, and at the other end of the line creatures like ourselves, whose anatomical complexities defy adequate portraiture. Between these extremes with their lines diverging in hundreds of directions, are found the great masses of animal forms now extant. The divergences in general anatomical structure are peculiarly obvious and fundamentally important in the case of the nervous system.

Nervous tissue appears to be simply a specialized form of protoplasm which has taken unto itself and specialized to a high degree what is in some measure, no doubt, a basic property of all living tissue, i.e., irritability and conductivity. The amœba with its relatively simple structure, wholly devoid of a specialized system of nerves, is nevertheless sensitive to stimulations from the world about it, and responds to these stimulations with movements of its entire substance. At a higher stage in organic life this sensitivity and the capacity to produce movements in one part of an organism by means of stimulations applied to other portions of it, is taken over by the specialized tissue which we designate the nervous system. In the course of cosmic time, sense organs of various sorts are differentiated with a peculiar capacity to respond to particular kinds of physical or chemical conditions in the surrounding world. Thus the eye becomes peculiarly susceptible to stimulations of light, the ear to sound, the mouth to the chemical conditions of appropriate fluids, the nose to certain gaseous

substances. This stage in the evolution of the nervous system finds the organism in possession of elaborate arrangements of nerve fibres, by means of which excitation of these different sense organs may be conducted into the various muscles, and so bring about changes in the position or the activities of the organism appropriate to the needs of the occasion.

It will appear at once upon a moment's reflection that if each sense organ were thus connected with but a single muscle, the actions of the organism would be extremely limited in number, and highly stereotyped in character. In order that there may be a reasonable flexibility in response, there must be some device whereby any given sense organ may be brought into connection with any particular muscle. This result is achieved through a kind of switch-board system in the central nervous structures, by means of which exactly this rich and flexible inter-connection of sense organs and muscles is provided for. These junction devices reach their climax in that portion of the

nervous system known as the cerebral cortex, a name for a profuse layer of nerve cells which constitutes the outer surfaces of the great hemispheres of the brain.

Comparative psychology and comparative physiology make it perfectly clear that the increasing complexities of nervous structure are paralleled by increasing complications in the animal reactions. The simpler the type of nervous system the fewer and more mechanical are likely to be the activities of which the animal is capable. On the other hand, the more elaborate this portion of the creature's organization, the more complex and adaptable are the reactions likely to prove. Taken in conjunction with facts presently to be mentioned, this circumstance has led to a very confident conviction that intelligence itself is, in some manner, linked up with the nervous activities, and that all the higher forms of intelligent action are contingent upon the presence of well organized nervous systems.

Anatomical studies have shown that particular portions of the brain receive nerve

fibres from particular sense organs and that other regions send out similar fibres to particular muscles. Comparative anatomy supplements this evidence by indicating that those portions of the brain and central nervous system are most highly developed which correspond to instincts or forms of conduct, in which the creature is peculiarly expert. For example, certain birds whose vision is well known to be of phenomenal acuteness have their receptive centres for visual stimuli most highly developed. Taken in combination with other forms of evidence still to be presented, the anatomical facts enable us to conclude that intelligence of a high order is correlated with remarkable development in the cortical nervous cells of the cerebrum.

Pathology has shown convincingly that certain forms of mental defect are dependent upon injuries to particular portions of the brain. This group of facts may be illustrated by the case of brain-tumor in which there occurs a loss, for example, of the visual processes. The character of the disturbance

must be sharply distinguished from that which is encountered in the case of disease or injury to some sense organ or to some peripheral portion of the nervous system. For instance, serious injury to the retina is quite certain to produce blindness, and the same result may accrue from an injury to portions of the optic pathway behind the retina but outside of the brain. In contrast to this situation we find, when extensive injuries occur to the cerebral cortex, that there is not only likely to be a serious disturbance, if not destruction, of the sensations received from the corresponding sense organ, but also that the *memories* which are preserved in that compartment of the brain are likely to be obliterated. Visual memories are destroyed when one part of the cortex is invaded, auditory memories when another region is affected, and so on.

Experiments on animals low enough in the scale to survive even when deprived of their cerebral hemispheres point to the conclusion that in the case of animals, at least, the presence of the cerebral cortex is not only an

essential condition for memory processes, but also that it is, in some way or other, responsible for a part of the spontaneity and independence of the animal's action. Animals thus deprived of the cortex tend to relapse into a more or less vegetative condition, in which they perform with reasonable accuracy the various types of familiar acts, but lack the disposition to initiate these acts unless some strong stimulating incentive be present. It must be admitted, however, that this effect is most marked immediately following the operation, and that after a time the animal may regain a large measure of its original spontaneity.

Evidence of the kind thus far presented gives detailed, specific, and scientific confirmation to the world-old belief that all the information which the mind acquires must come to it through the operation of the physical senses, and to this conviction it adds the still further evidence that particular portions of the brain are also indispensable for the receiving into the mind of such information. Moreover, it makes clear the de-

pendence of our various forms of memory, visual, auditory, motor, etc., upon particular regions of the cerebral cortex. It also affords demonstration of a similar concrete kind that the execution of acts of will depends upon the control of the muscles which, in their turn, are under the immediate direction of the brain. Ethical and religious theory has often maintained that the will, like the human spirit, is essentially independent of all physical limitation. But facts such as have been cited above render it sufficiently obvious that all the important operations of the will involve overt conduct, which proves under analysis to be nothing more nor less than the movements of the bodily muscles. The control of these muscles is certainly in no sense to be understood as conditioned directly by spiritual forces. Nervous impulses sent out from the appropriate regions of the brain or central nervous system are the means whereby these motor activities are brought to pass.

Taken in its entirety, then, the type of evidence which we have just been surveying points not only to a general dependence of

mental life upon the brain and nervous system, but also to a very detailed dependence of particular features of mental life upon particular portions of these nervous structures. Sensation, memory, emotion, and will, one and all, are found connected with the activities of special areas or regions in the nervous system.

When one takes into account the considerations touching the development of the central nervous system among animal forms, and compares these facts with others embodying the teachings of modern biological science concerning the human nervous system, such as have just been reviewed, one is obliged to accept the conclusion that the growth of intelligence has in a general way run parallel with the development in the complexities of nervous organization, and particularly with the growth in internal complexity of structure in the region of the cerebral cortex.

This conclusion finds striking confirmation in the evidence gained from the study of the development of the young brain, both in the case of children and in the case of ani-

mals. The young animal prior to the period at which it comes into possession of its full powers is found to possess a brain which is not so much undeveloped in point of external size as it is incomplete in the internal organization of the nerve cells and fibres which go to compose it. Similarly, in the case of children, the brain attains its maximum size, so far as concerns its general external contours, at a relatively early period, say at about seven or eight years of age; but, as every one recognizes, the growth in intelligence may continue indefinitely after that time, and in practically every human being it does continue in a demonstrable degree for at least twenty or thirty years. Examination of the brain at different ages shows quite clearly the character of the changes that have occurred during the later stages of growth. They are found to be resident in the inter-connections of the nervous elements which go to make up the brain, and particularly the cerebral cortex. Whereas at the outset the connections are relatively few, at maturity, especially in the case of highly

developed individuals, these connections are numerous almost beyond belief.

So far as concerns the interests of empirical science — and psychology is such a science — the connection of the mind with the brain is no longer an hypothesis, but one of the established facts. Metaphysical speculation is quite free to interpret this connection in any way it may see fit and in any way it can render convincing.

As has already been mentioned, there is at the present time abroad in our communities a considerable mass of belief that mind is really the fundamental essence of existence, and that the body, and perhaps all the rest of the physical universe, is but a form of mental expression. This type of belief has appeared in all periods of the world's history, and is cherished in many quarters as a sacred religious tenet. Psychology rests under no obligation to discuss interpretations of this character, any more than does physics or chemistry. Its obligations begin and terminate with the attempt to state honestly and completely the facts as they appear to imme-

diate observation. Such interpretations as it employs are directed to rendering intelligible, for purposes of scientific and practical control, the phenomena which thus appear to ordinary common-sense inspection. It may be that the body is indeed a mere figment of the mind, but in the actual practice of the human race this hypothesis is not found usable, and it is certainly not capable of such presentation as to compel universal acceptance. Under these conditions, psychology does exactly what the other sciences do, and what common sense does, i.e., it presents the facts from the standpoint of ordinary experience and applies only such hypotheses as are found necessary in rendering the facts practically intelligible.

It must be recognized that this attitude on the part of psychology has led it to be accused of a peculiarly crass type of materialism. This accusation is just, in so far as it implies that psychology has, as a science, failed to teach the doctrine that mind is the sole reality in life. It is untrue in so far as it means that psychology goes out of its way to assert

that mind is merely a secondary product of the processes of matter. In point of fact, certain psychologists undoubtedly have leanings toward a materialistic metaphysics, others are quite as unequivocally disposed toward spiritualistic hypotheses. But as psychologists both parties attempt to report the parallel facts of brain action and mind action in an unbiased fashion. The intimate interconnection of the two series of phenomena and the advantageous practical results of treating them together, no longer are open to question. It is as unfair to accuse psychology of being materialistic as it is to accuse mathematics of being so. The facts gained by any empirical science may be used in various philosophical interpretations, or may be displayed from angles favorable to different hypotheses. But this is not the prime purpose for which they have been secured, and it is certainly no part of the business of a science to undertake such generalizations.

Physiological psychology by no means confines itself to a study of the relations of mental process to the *central nervous system.* It

searches for every possible detail of the correlation between mental action and general bodily function. Particularly in the range of sensory experience has it been able to trace the nature of certain of these inter-relations.

Vision affords a peculiarly obvious instance of the way in which bodily organization determines mental experience. The mere fact that we have two eyes and that our perception of visual objects involves the use of both produces in us certain kinds of spatial impressions. These can at once be seen to be very different when one eye alone is used. The two eyes in looking at a solid object see each a slightly different part of the object, and the combined images give us a sense of solidity which we should gain only indirectly by the use of monocular vision.

Again, if one eye be closed and the gaze of the open eye be fixed upon some point in front of the face while a small object like the head of a pin is moved slowly across the field from right to left at the height of the eye, a region will be found where the object suddenly disappears, to come in view again an

instant later as the movement continues. This disappearance, which occurs while the object is quite near the centre of the field of vision, is occasioned by the passage of the object across the field of the "blind spot," the region at which the optic nerve enters the back of the eye and spreads out to form the retina.

Color-blindness, from which every one suffers to some extent, affords another instance of the dependence of visual consciousness upon the structure of the eye. The outer zones of the retina report color distinctions very imperfectly. Green and red can ordinarily be seen in their proper hue only over a small area immediately about the centre of the field of view. Yellow and blue may be seen appreciably further out, but on the extreme edges of the retina only white, black, and gray are to be discerned, and all other colors tend to take on these hues when presented in the margin of the field of view. This can readily be demonstrated by a simple test.

If one eye be closed and the other eye be

fixated on some object in front of the face, it will be found that small patches of red or green, when moved from the centre toward the edge of the visible field, will change color and finally pass over into gray. Other colors behave in a similar manner. Owing to various influences, in particular to the constant movement of the eyes and to our knowledge of the colors of objects, these aberrations of vision are not commonly noticed.

Dozens of other instances might be chosen to illustrate in the same fashion the intrinsic dependence of our visual sensations upon the structure and action of the eye.

In a similar way it may be shown that our sensations of touch, of temperature, and of pain depend in a striking way upon the conformation of the different surfaces of the body and the distribution of the nerves in the various regions.

Certain portions of the body, like the cornea, are exquisitely sensitive to all forms of contact, and practically without exception report pain when touched. Other regions

are extremely insensitive to contact and especially to the appreciation of space relations. Thus, for example, if the points of a pair of dividers be brought into gentle contact with the skin on the back of the shoulders, or on the thigh, the points may need to be several inches apart before we can be certain that we are touched with two points and not one. But on the finger tips, the lips, or the margins of the tongue the points must be brought together to a very small fraction of an inch if they are to produce an impression of a single point. Temperature sensitivity is likewise very diverse on different surfaces of the body.

In each of these cases the only satisfactory explanation of the different peculiarities in the mental experience is to be found in the special structure of the sense organ and in the location of the nerves. We might in the same way cite illustrations *ad libitum* from all the other processes of sense, and particularly from those of sound. They would, however, serve but to confirm what has already been said — that the life of

sensation is dependent in a very detailed and concrete way upon the structure and activity of the sense organs.

Another great range of observations relevant to the present topic is found in the studies of the inter-connection of the phenomena of feeling with the general physiological conditions of the body. More specifically and by way of concrete illustration reference may be made to the supposed connection of pleasure and pain with the activities of respiration and circulation, and with the general tonus of the muscular system. It should be said by way of introductory qualification that there is considerable diversity of opinion concerning the exact facts, and the subject is now under discussion.

On the basis of experimental investigation it is held by certain psychologists that pleasure, for example, is always accompanied by certain fixed changes in breathing and in circulation, and that pain is always accompanied by an opposite set of these phenomena. Pleasure, it is alleged, is always found coincident with an expansion of the blood vessels of the

surface of the body, whereas pain is always accompanied by a contraction of these vessels. Pain is alleged to occasion a decreased amplitude of the heart-beat, whereas pleasure is supposed to have an opposite effect. These same observers allege that pleasure discloses an increased power in the voluntary muscles, for instance, an ability to lift a greater weight immediately after a pleasurable, than after a painful, experience.

To attempt the defence or criticism of these asserted parallelisms is irrelevant to the present subject, although it is fair to say that a considerable group of experimentalists regard these correlations as far less uniform than the previous statements would imply. Nevertheless, there is nowhere any disposition to call in question the more fundamental fact; namely, that every change in consciousness, and particularly every change of a markedly affective character, is accompanied by alterations in these physiological operations of the body.

Not many years ago public attention was widely drawn to Professor James's Theory of

the Emotions, in which he pointed out that the characteristic feature of our emotional experiences, which marks them off most definitely from other forms of mental life, is to be found in the presence of strong reflex movements of the organism which are reported to us in the form of sensations and feeling. From this point of view anger and fear as emotions differ from unemotional experiences, primarily in the presence of the reflex excitations of the heart, of the breathing, and of portions of the voluntary muscular system. Were our consciousness not invaded by the feeling of trembling limbs, parched throat, faintness, and nausea, we might perhaps be cognizant of a situation as containing danger, but we should certainly not have the emotion of fear.

It is not to be understood that emotion is merely identical with these bodily sensations and feelings; there is normally, of course, in mature experience a definite intellectual apprehension of the situation which causes the emotion, and the mental state is often one of extreme complexity. Nevertheless,

James is essentially correct in pointing out the inevitable prevalence of these reflex bodily reactions if we are to have the full-fledged experience of emotion. It may be said, then, that, as in the case of sensation, and of affection, or feeling, the emotions depend very definitely upon the existence and activity of particular parts of the body.

Thus far we have directed attention chiefly to those cases in which the mind is seen to be dependent upon the body for the reception of impressions, whether through the stimulation of the senses by external objects, or through the reflex arousal of these sensations within the body itself. An equally important group of relations is represented in the dependency of the mind upon the body for the expression of mental purposes. It is no doubt sufficiently obvious that in all ordinary instances our resolutions and decisions have reference to acts which require overt expression in words or deeds. To be sure, certain of our decisions may refer to the mere continuance of our own thought-processes already in progress, as when we decide to

pursue a train of thought, rather than to interrupt it for the execution of some other purpose. We do not customarily think of the continuance of such a train of thought as involving muscular activity, although in point of fact it does require such muscular action. But all the ordinary affairs of life which necessitate our deliberation and reflection demand the translation of our mental resolutions into the form of motor activity. We must move our hands or feet or vocal apparatus in some effective manner, if our will is to be anything but a mere figment, if it is to make itself felt in the real world.

We have purposely spoken of these instances in which the mind expresses itself through muscular movements as cases illustrating the dependence of mental process upon the bodily organism. Evidently a converse view might with entire justice be entertained. We might describe the situation as one exemplifying the subserviency of the body to the mind, whose vassal it is. This attitude finds striking support in many well known phenomena upon which is based much of whatever

is true in the contemporary forms of "mental healing" so-called.

Certain it is that emotional disturbance reacts upon general bodily conditions in ways which are either wholesome or harmful, depending on the character of the emotion. Profound grief may undoubtedly be fatal to life, and when it has no such serious termination, it nevertheless occasions grave derangements of the vital functions. The physically depressive effects of anxiety are all too familiar to our somewhat neurasthenic American type. On the other hand, love and joy and pride and the spirit of rivalry may prodigiously augment the vigor of our bodily processes.

Experiments of a highly ingenious character have been made upon animals showing that the active progress of digestion may be almost instantly checked by a slight shock of fright or by other depressive emotions; whereas agreeable emotions stimulate these activities to more vigorous performance.

Again, the effective action of the voluntary muscles ordinarily requires the mandate of

the mind, and if this be withheld, the muscles remain quiescent. To be sure, violent stimulations may agitate the entire bodily frame. But the normal activities of the voluntary system are dependent upon mental direction.

On the whole, then, there would perhaps be as much evidence tending to show that from a practical point of view bodily changes follow upon mental ones as that mental ones depend upon those of the body. It remains simply to repeat that the business of the physiological psychologist is primarily to present the facts as honestly and as completely as he can concerning all the forms of mental and bodily connections. Ultimate interpretations of these facts must be left to the philosophers.

LECTURE III

EXPERIMENTAL PSYCHOLOGY

LECTURE III

EXPERIMENTAL PSYCHOLOGY

EXPERIMENTAL psychology, taken in conjunction with physiological psychology, undoubtedly sounds the keynote of the modern movement in the study of the mind, and our next task must be to sketch its main characteristics. Until the development of experiment, the sole method for securing data about the mind was that of ordinary observation. One may practise this, either as direct introspection by noting one's own mental states, or as indirect observation by studying the minds of others, as revealed in language or gesture. But all such observing is likely to be relatively incidental, and executed after the fashion in which one follows the vagaries of weather or of politics — thoughtfully, perhaps, and even persistently, but still in the fragmentary manner of one who merely marks down the facts which pass before his notice. Experi-

ment changes all this. It not only improves methods of introspection, it also supplies purely objective tests of mind which require no introspection whatever. Tests on memory, such as will be described, require introspection no more than does learning a lesson. A task is set to be performed under given conditions, and the mental facts are determined and judged by the objective result attained by the efficiency of the performance.

Experiment, in psychology, is essentially like experiment in any other range of science. An experiment is simply an observation made under conditions of control. The ordinary observations of nature have to be made whenever and wherever opportunity permits. Thus, if one is to study botany, one must observe the phenomena of tropical plant life in the tropics, and in zoölogy the examination of the fauna of arctic regions can only be carried on under arctic skies. To be sure, the ingenuity of modern scientists has brought it to pass that in our laboratories we are able to simulate many of the conditions of nature in such a way as to permit the experimental

control of facts which, in a previous generation, could be studied only where nature herself supplied them. In any event, the essential fact in experiment is that we shall be able to produce the phenomena which we desire to study.

The advantages of this procedure are so obvious as hardly to require elaboration, and it is a matter of common knowledge that the remarkable achievements of modern science are largely due to the development of experimental methods. It is clear that if one is in a position to alter some single factor in a given situation one is enabled to judge from the consequences which follow, as compared with the consequences which are observed when this factor is allowed to operate, what its real causal significance may be. To illustrate, suppose one desires to study the effects of light upon the growth of plants. Nature herself gives us much evidence bearing on this matter, and yet in nature light seldom varies unaccompanied by changes in other physical phenomena. It is combined in an almost invariable way with the production

of heat, and it frequently varies in a confusing manner with conditions of moisture. Now it is possible in the laboratory to produce a situation in which every circumstance except light shall be kept perfectly constant. Under such conditions, by supplying white, red, green, and blue lights, and by remarking the effects upon the various forms and processes of vegetation, when light is taken away or when it is allowed to play uninterruptedly upon the plant, one is in a position to determine the significance of all kinds of light for the phenomena of plant life with a certainty which would never be possible from observations of nature alone.

Not only is there this obvious advantage of being able to analyze out relations of cause and effect in a way which otherwise would be vastly more difficult and require vastly more time, but experimental procedure also possesses another quality, which makes it of indispensable significance for modern science. This is the possibility of *verifying* alleged observations many times over and at the hands of many different observers. From

this circumstance it comes about that scientific doctrine can be much more quickly and crucially tested than was formerly the case.

Experiment in psychology has precisely the same merits and involves precisely the same kind of procedure that it does elsewhere in the natural sciences. For centuries, common sense had assumed that mental processes could not be submitted to the conditions which are essential for experiment. Indeed, only within the last three centuries has the true significance of experiment secured adequate recognition anywhere in science. It has been a common source of reproach to psychology that it could never become a true science, partly because it was alleged that it could never employ mathematics and could therefore attain no real accuracy, partly because, as has just been said, it was regarded as being outside the range of experiment. Both these assertions have been disproved conclusively.

It is customary to date the appearance of experiment in the field of psychology from

the time when the German physiologist, E. H. Weber, made his celebrated observations on the pressure sense, which he followed up by other observations on vision and the temperature sense. This work covered the decade between 1840 and 1850. Weber himself was a physiologist, but his experiments, to which reference is made, involved mental processes in a manner which once and for all disproved the impossibility of submitting the facts of mental life to experimentation. To be sure the field in which he worked was that of sensation, and for many years it was believed that only in this field could experimental methods be widely used. The subsequent history of psychology has shown this belief also to be ill-grounded. In every range of mental life it has been found feasible to subject certain of the phenomena to conditions of control, and wherever this can be done we have the essence of experiment. The actual scope of the method can be determined only by applying it systematically to one field of mental life after another. As elsewhere in the empirical sciences, it is highly

indiscreet to dogmatize in any *a priori* way upon the limitations of a given method. Experience is the only teacher that can be trusted here.

A few concrete illustrations may serve to make clear the manner in which experiment is available for the study of mental life. Indeed, this is the only way to convey an accurate impression. At the risk of tedium, illustrations will be offered, covering a number of typical forms of investigation.

It has already been pointed out that psychological experiment began with the sensation processes, and for many years the most important work was done in this field. The reasons for this fact are fairly obvious, when one remembers that the essence of experiment consists in the control of the phenomena studied. Clearly sensations are the mental processes in which control can be most immediately and unambiguously introduced, because they are most directly connected with the physical stimulations which we are in a position to govern. Light, sound, odor, taste, and the other forms of physical

stimuli which occasion sensations can all be controlled by us with a considerable degree of certainty and accuracy. We are thus able to expose the eye to any given color which we desire, to expose the ear to a tone of any given pitch, quality, and intensity. The sensations which are called forth by these stimuli can therefore be indirectly governed through our ability to regulate their physical antecedents. To be sure, there is no necessary parallelism between the stimulus and the sensation, unless the reagent upon whom our experiment is performed is willing and able to give us his undivided attention. If he chooses to render his mind oblivious to the stimulations, experience shows that he may in large measure succeed. But in practice, experiments are commonly performed only on such persons and under such conditions as assure thorough concentration upon the matter in hand. Under such conditions the parallelism between sensation and stimulus is very genuine. Our first illustration may therefore well take the form of an experiment on sensory activities.

The range of taste offers a familiar form of experiment — one designed to demonstrate the elementary qualities in a given department of sensorial experience.

Epicures are at one with the dictates of common sense in supposing that we are in possession of almost innumerable varieties of tastes. Ordinary introspection tends on the whole to confirm this impression, but a very simple form of experimental procedure serves to disabuse the mind of it.

In the first place, a remarkable change comes over most of our sensations of taste, provided we eliminate all sensations of odor. This can be done with sufficient accuracy by plugging up the nostrils with cotton. The effect of this change upon taste is comparable with that which is experienced when, while suffering from a cold, we find that we have, as we say, lost our taste. The reason for the loss is largely identical in the two cases. Furthermore, many of the tastes with which we are most familiar are connected with characteristic temperature and contact values. The common foods have their tastes

radically altered by unusual temperature conditions. Cold coffee, cold mashed potato, and cold peas, are each and every one essentially different in taste from the same article when warm. The contact values are also extremely significant. This is perhaps observed most often in connection with ices of various sorts. Certainly most persons have remarked how different in many particulars is the taste of ice cream before and after it has melted.

In order, therefore, to execute a satisfactory exploratory test upon taste, one must in some fashion control smell, temperature, and touch. Smell can be controlled, as was indicated above, by practically eliminating it. Temperature and contact cannot be altogether eliminated, but they can be kept *constant* by reducing all the taste stimuli to liquid form (in point of fact, taste stimuli must be reduced to liquid form before they can stimulate the taste nerves) and by keeping the liquids at a constant neutral temperature. When these precautions are observed, all the usual varieties of tastes are

readily reducible to, at most, four elementary forms, sweet, bitter, sour, and salt. It is even possible that we shall find one or more of these tastes still further reducible.

The next instance may be taken from the range of color and the determination of certain laws of after-sensations or after-images.

It is a matter of common knowledge that if the eye be fixed upon a colored surface for a few moments and then be closed, or turned upon some neutral gray surface, we secure what is called a negative after-image. Many persons have noticed this fact, but under the conditions of ordinary observation one never secures any knowledge of the uniformities which characterize the after-image process. By taking specimens one after another of the colors represented in the spectrum, exposing them to the eye for a fixed period of time, and under constant conditions of illumination, one may in a relatively short period learn precisely what color will appear in the after-image following each kind of stimulus, what differences mark off one

color from another as regards the rapidity with which the after-image is formed, and the permanency with which it is retained. We learn in this way that every color has a perfectly fixed counterpart in the series of negative after-images. By other easily performed experiments we can prove that these colors are such that if mixed together they will produce the color gray. We call such colors complementaries. Yellow and blue, green and purple, red and blue-green are examples of such complementaries.

The *positive* after-image may be experimentally studied in a similar manner. It will be found appearing when, after a period of rest, the eye is suddenly turned upon a bright object and then quickly closed. The object will be seen for a few moments in its natural color, and with a distinctness and vividness approximating that of the original sense impression. A momentary glance at the filament of an electric light will generally produce the image.

A third and final sensorial illustration, involving a somewhat more complicated sit-

uation, may be selected from the range of auditory experience. Suppose we desire to ascertain exactly what are the factors upon which depends our ability to localize sounds. Common sense has long since made the generalization that we localize sounds on that side of the head from which we secure the more intense stimulation. Clearly this statement, true as it is, leaves a large part of the facts quite unexplained. How does it come about, for example, that we not only are able to determine with certainty on which side of the body a sound is located, but that we are also able to tell with some approach to accuracy whether the sound is in front of us, or back of us, as well as to one side? In point of fact, this latter type of localization is relatively uncertain, nevertheless it is often practically of importance. In order to determine the facts with experimental certainty, recourse is had to certain simple forms of apparatus.

The person to be experimented upon is seated in such a way as to have the head located at the centre of an imaginary sphere,

some three or four feet in diameter. By a simple system of supports it is so arranged that a telephone, or other sound-producing instrument, may be placed at any desired position upon the surface of this sphere. The reagent being blindfolded, the experimenter by closing an electric key produces sounds in the telephone from various directions, in front, behind, above, below, right, and left, and invites the reagent to designate the position from which the sound comes. This he may do, either by pointing, which involves a serious source of error, or by naming the general region from which he believes the sound to emanate in accordance with an arbitrary system which he has been taught before entering upon the experiment.

The outcome of such investigation shows quite clearly that although our capacity to localize sounds is primarily dependent upon the relative intensity of the stimulation of the two ears, a great deal depends upon the *quality* of the sound and the modifications which this quality undergoes by virtue of the interference with the physical sound waves

brought about by the bones of the skull and by the contours of the external ear.

The same effect may be noticed in the commonest daily experiences. A cart rattles past and turns the corner. As it turns, there is not only a marked decrease in the intensity of the noise, there is also a pronounced change in its quality. This change is caused by the intervening houses which cut off certain of the sound waves. In the same way, the note of a piano presents a quality to the ear when it is struck behind the ear and to one side, quite different from that which it presents when heard on the same side but well in front of the ear. This is due to alterations in the overtones which reach the ear in the two cases, as though one were to subtract certain of the components of the sound. Experience has taught us with some accuracy to translate these differences of tonal quality into terms of direction. But perfectly pure tones, like those of tuning forks lightly sounded, though easily localizable as either right or left, are localized, as being in front or behind the vertical plane passing

through the two ears, only with utmost uncertainty. This is because their quality is practically unalterable, owing to their freedom from overtones. Changes in intensity are therefore the only noticeable alterations which can be produced in them by a change of position. The physical reasons for these modifications of the sound are sufficiently well understood, but it would take us too far afield to enter upon them with detail.

In each of the instances which we have chosen for illustration it is clear that the essence of the experiment has consisted in controlling the physical stimuli which produce sensations, and then observing what alterations appear in the field of consciousness. The control over consciousness itself has therefore been indirect. It has, however, been none the less real because of that.

Although the first important steps in experimental psychology were taken in the field of sensation, and although the larger portion of its literature is undoubtedly concerned with the study of sense processes, it is nevertheless true that at the present time

interest is more vitally centred in other aspects of mental action; and it may be said without hesitation, that no large department of conscious process has resisted altogether the ingenuity of the experimental psychologist. We shall touch very briefly upon certain characteristic features of this work on the higher phases of consciousness.

Memory affords a number of interesting instances of experimental investigation. The first great difficulty to be overcome in investigating memory processes has been to secure material which might be memorized on different occasions and under different conditions, with some certainty that it should be in all its parts equally easy, or equally difficult, to acquire. The point of this requirement may be made evident by an illustration: Suppose we desire to ascertain how permanency of memory is affected by repetitions of the material to be learned. Is it true, for example, that material presented to the mind four times is remembered twice as long as material presented only two times? Clearly, in order to answer such an inquiry

as this, one needs to have a large amount of material, portions of which may be presented any desired number of times, and other portions a less or a greater number of times, with the assurance that these various portions in themselves present like difficulties to acquire.

To meet this need various kinds of material have been employed. Probably the most ingenious is the nonsense syllable devised by the German psychologist, Ebbinghaus. This consists of a vowel flanked by two consonants, all the possible combinations which the alphabet affords being thus constructed, and all the significant syllables, like dog and cat, being eliminated from the list. Material of this character can obviously be varied as regards its length, as regards the order in which the syllables are presented, and can reasonably be assumed to offer substantially equal difficulty of learning in each of its parts.[1]

[1] It should be said that in point of fact this material is in no literal sense of like difficulty throughout. Some syllables, for reasons upon which we need not enter, are certainly more difficult to learn than others. Broadly speaking, however, the material does satisfactorily fulfil the demands for which it was invented.

Numbers have been used for the same purpose; also letters of the alphabet and various graphic forms like those familiar in geometry.

In other varieties of memory experimentation ordinary linguistic material is used, whether prose or verse. Sometimes the object of the experiment is to test the peculiarities of *verbatim* memory, sometimes to test memory in its more usual form of capacity to retain *meaning*, without reference to its precise verbal embodiment.

In each and all of these cases the essential fact in the experimental procedure is that we are enabled to control with some approach to completeness the conditions upon which memorizing depends and by altering now one, and now another, of these conditions, we come to a more intimate and precise knowledge concerning the principles upon which memory is based.

An interesting illustration of the kind of information which has thus been gained is afforded by the investigations of forgetting. Common experience fails to furnish us with any adequate impression of the way in which

forgetting occurs. In the case of verbatim memory processes, for example, few persons have any accurate notion as to the period during which the forgetting of that which they have learned goes on most actively. Probably the general impression is that forgetting goes on rather slowly at first, and then, after the lapse of a considerable time, is perhaps augmented in rate. Assuredly the belief is but rarely entertained which corresponds in reality to the facts; i.e., that the most important period is that immediately following the cessation of the learning process. Certainly, in most cases when a material has been committed to memory so that it can just be reproduced with accuracy, forgetting goes on much more rapidly during the first few hours after the learning, than it does at any subsequent period, and the first few minutes are again most important in the disintegration.

The moral of this tale for practical purposes is perfectly clear. Any material which we desire to retain with maximum permanency should be presented at relatively short

intervals again and again, until it has been stamped in with some approach to indelibility. To be sure, this moral for its complete establishment requires other forms of experiments than those indicated, but such experiments have been satisfactorily performed and there can be no essential question about the truth of the general principle just enunciated. It has thus been shown, for instance, that, for many kinds of material at least, it is better if one proposes to devote three hours to a process of memorizing, to distribute the efforts at learning in groups of ten or fifteen minutes, let us say, with intervals of half an hour or an hour in between, rather than to use the entire three hours uninterruptedly. The negative aspect of this fact has long been familiar to students who practise cramming for examinations. The material thus assimilated can often be held for a few hours, but it is for the ordinary individual absolutely impossible to secure any considerable permanency of retention in this way.

It must be emphasized that the statement

made concerning the manner in which forgetting goes on applies only to the case in which the material has been *learned* just thoroughly enough to permit one successful reproduction. If, however, the material has been repeated many times after this degree of control over it has been secured, the process of forgetting may not follow precisely the lines above laid down, and certainly it does not proceed with any such rapidity as in the former case. Distinction would also have to be made between processes in which the material has been assimilated verbatim, as compared with those in which memory has been directed simply to retaining the meaning. On both of these points experimentation is as yet too incomplete to justify any confident assertions.

A very interesting group of experiments has been made dealing with another aspect of this problem of economy of effort in memorizing, and it has been shown that for many kinds of material the well-established, world-old method is needlessly expensive. In learning poetry or prose by heart the

common practice has been to learn a line or a phrase at a time, or possibly a couplet and two phrases at a time, going on to the next phrase only when the preceding had been mastered. It is much better, with occasional exceptions, to go through the selection as a whole, time after time, rather than to take it piecemeal. It saves time and gives a more permanent hold on the material for the same expenditure of effort.

Another field of experimentation is represented by attention. One of the oldest of the problems in psychology concerns the so-called scope, or range of attention. How many objects can be attended to at once? This problem is peculiarly susceptible of experimental attack and is hardly susceptible of any other convincing solution. Evidently the reply which one makes will depend upon the period of time during which attention is observed, for if one be allowed to glance at a group of dots upon a page, the number which one may perceive will certainly depend upon the length of time occupied by the glance. If this be one tenth of a second, the results

will be very different from those obtained when the time is one half of a second, and very different from those when an entire second is allowed for the inspection. It does not help us to define the problem as one concerning the number of objects which can be perceived in a single *moment* for there is good reason to believe that with changing conditions psychological moments may vary quite widely.

The experimentalist has gone about the solution of the problem in a business-like way, by providing himself with such apparatus as will permit, in the case of vision for example, the exposure of objects for varying intervals of time, ranging all the way from those too brief to permit any visual reaction, up to those which will allow repeated acts of attending to be executed. In addition to this, he provides that the number of objects which he exhibits may be readily controlled and that the positions in which they appear may also be such as he may desire. The type of apparatus commonly used for this involves a falling slide like a guillotine, or a revolving

disc of some sort, which may expose for known intervals of time and then conceal again, letters, lines, figures, or other objects of various kinds.

With apparatus such as this it is at once discovered that the number of objects which can be attended to simultaneously depends upon the illumination, upon the length of time given for the eye to make its observation, upon the size and distinctness of the objects, and upon the placing of them close enough together so that they can be actually seen as a whole without moving the eye. This statement makes it evident that before we can satisfactorily state how many objects can be perceived at once, we must take cognizance of conditions such as those named. In a bright light more such objects can be discerned than in a dimmer light. The period of time during which the objects are exposed may be so brief as to defy successful vision altogether. Under the best conditions it is found that from three to six such objects as letters may be seen simultaneously in a single pulse of attention, and if the

letters are arranged in words, the number may jump up to more than twice this figure.

The experiment indicates clearly enough that the old form in which the question is customarily put is likely to prejudice an accurate answer. It appears that a fairer form in which to raise the issue is to inquire how *complex an object* can be apprehended simultaneously in all its parts, for in perceiving a number of figures or letters in this instantaneous manner, we perceive them as essentially one complicated object.

Similar experiments have been made upon sounds and contact sensations, with the result that each of the sense organs is found to present peculiarities and to necessitate a special formula. In the range of sound, for example, we find that if a number of sharp taps be given in rapid succession, we can group considerable numbers of them into single bundles, as it were, to which we apparently attend as to a single sound. The number which we can thus combine depends upon several circumstances, among others the speed with which the sounds succeed one

another. If they come slowly we can attend to a much smaller number than when they come rapidly. On the other hand, if they come too rapidly, they are likely to fuse into a single sound.

It might seem at first sight quite difficult, if not impossible, to make experiments upon the will. Nevertheless, we have an extensive literature dealing with precisely this problem. To the unpsychological layman, "will" is likely to suggest a highly abstruse spiritual entity, very real, but certain to elude all efforts at experimental control. To the psychologist it is simply a name for certain forms of mental action; namely, those in which we foresee and actively desire certain results to be accomplished by our own acts. The problem of its analysis consists therefore in the study of the actual mental processes by means of which we foresee, select, and assent to certain lines of conduct. Experimental procedure has accordingly been directed to creating artificial conditions in which this process could be observed and varied in certain fixed ways.

One of the commonest and most fruitful forms of experiment concerns the so-called reaction time test. This experiment consists in determining the manner in which some specified movements of the hand, the lips, or other muscles, are brought about, upon the discerning of a sense stimulus of one kind or another. In a common form of the test the reagent moves an electric key with his hand the instant he hears a sound in a telephone held to his ear. Under the ordinary conditions of the experiment he is instructed to make the movement as promptly as possible, and the time elapsing between the giving of the sound and the occurrence of the movement is measured by very delicate clocks.

Experiments of this character, artificial as they may at first thought appear to be, have thrown a flood of light upon the actual manner in which such movements as those referred to are actually controlled. Nothing is perhaps more surprising in the results of the observations than the amazing variety of ways in which different individuals per-

form what is, in a practical sense, one and the same act.

To illustrate: Of two individuals whom we might select for such an experiment, the one may find that upon attempting to move the hand promptly on hearing the sound, his attention is almost entirely absorbed in the anticipation of the coming sensation. This anticipation may take the form of imaginary sounds similar to the one expected, or it may take the form of attending to sensations arising from the rigid muscles of the neck and face, or it may consist in attention to a visual picture of the imagination, portraying the telephone or the reagent's own ear, or something of that kind. The other reagent, in distinction from the first, may find that his attention tends to turn strongly toward the movement he is about to make; he may find that his gaze is fixed rigidly upon his hand, or he may find that he is attending to sensations of strain in the muscles of the wrist or hand, which is already cramped and rigid in preparation for the coming movement.

Each of these persons is performing what ordinarily we should call the same act, and yet in point of fact, the actual mental antecedents of the motion of the hand are in the two cases utterly divergent. It appears, therefore, that where movements are made in response to sensory stimulations, there may be the utmost variety in the actual mental factors employed to accomplish the act. Moreover, these variations are likely to be deeply ingrained, so that to react in any other way is difficult, disconcerting, and ineffective. A study of the time occupied by the different kinds of reaction is also interesting, but we must forego its consideration.

A number of very interesting studies have been directed to ascertaining in a similar way what the mental antecedents may be of various forms of voluntary muscular action, when the response is to ideas rather than to sensations, and when there is no premium put upon promptness of response as in the reaction case. Not the least suggestive of these experiments have been directed to determining how one gains control over muscles which at

the outset cannot be voluntarily moved at all. The muscles of the ear are, for most persons, not under such direct control. Yet one can be taught to move the ear, and in the process can determine how it comes about that one secures the new powers.

In these particular instances it has been found indispensable to secure first through accidental or artificial means the *feeling of the muscles* when actually in motion. This can in part be done by electrical stimulation and in part by voluntarily moving the adjacent muscles like those of the scalp, which are in most persons already partially under control. Once a clear experience of the feeling of the moving muscles is gained, the mind is apparently in a position to aim at this feeling in isolation and so to bring the movement to pass.

Again extensive observations have been made to ascertain what passes through the mind when one voluntarily moves his hand in response to a certain thought, a certain idea in the mind. Some extremely illuminating studies have been made along this line by

examining the mental processes in writing. It need hardly be pointed out that in such an instance as this there is the widest variation of method, depending upon the extent to which the movements concerned have become habitual. Thus the writing process in a little child just learning to form his letters involves a very different focus of attention from that of the writing of an adult, for whom the making of the letters requires vastly less guidance. Studies of this kind serve to disclose many unexpected features in the manner of controlling the writing coordination, even when inscribing one's own signature, which ordinarily demands a minimum of supervision.

Not a few persons find it absolutely indispensable to keep the eye upon the pen-point, or at least upon the page, if the writing is to go forward in a manner at all efficient. Such persons upon closing their eyes are likely instantly to form a visual picture in imagination of the hand and the page and the words being written. Others are largely independent of the visual control, and rely mainly

upon the feeling which comes to them through the hand and arm. Others again show a most amusing dependence upon the sound of the scratching pen-point. By means of this, even though the eyes be closed, they can write quite successfully, but if this be eliminated, the natural formation of the letters is immediately affected. The writer becomes lost and cannot tell what letters he has made, nor what he should make next.

Probably most persons who have learned to write with any ease would allege that, when writing, their minds are preoccupied with the thought of that which they propose to put upon the paper, and that they attend, if at all, only in the most incidental and occasional manner to such points as have just been mentioned. Nevertheless, a very small amount of experimentation would convince them of the error of this belief, and would demonstrate convincingly to how large an extent their control over the coördinations of writing is really dependent upon the sensory factors of vision, muscular sense, and sound.

Vigorous controversy has raged of late over the question as to whether all control of our voluntary movements depends upon the employment of sensations on the one hand, and imagery of an anticipatory kind on the other. Every effort is being made to settle the matter by experimental methods. Certain psychologists allege, as a result of their own observations, that our movements are not infrequently brought about by mental states which they designate "pure thoughts." By this term they mean to indicate the absence of all imagination in bringing the movements to pass. Most inexperienced observers are likely to confirm this belief, in part, no doubt, because of the difficulty of introspection for the novice. But there is a considerable party of psychologists who are equally strenuous in their assertion that no movements other than those of a reflex or highly habitual character are ever brought about wholly without the antecedent presence of sensations or of imagery. It must be remembered that under the term imagery is to be included all the verbal forms of

thought, all the mental language in terms of which a great majority of people carry on the larger part of their thinking.

One further topic may serve to complete our illustrations of the range of experimental procedure. Among the varieties of reactions are certain ones known as association reactions, to which attention has been widely drawn during the last few years. The fundamental object of these experiments is to determine the principles upon which our thoughts are knit together, and more specifically in certain instances to ascertain whether a given thought is at all connected in the mind with certain other thoughts. The mechanism of the experimentation can be readily understood by means of a very brief description. In one form of the test lists of words are prepared, and one at a time is shown through a slit in a screen, and the reagent is required to announce as promptly as he can the idea which is called into his mind by the word. The time which is required for the process is measured. By means of such devices it becomes possible,

after making many experiments, to determine the fundamental bias which may be possessed by the reagent in favor of certain types of association. In this way one mind may be found characterized by very simple and concrete associations; another mind by much more imaginary and romantic combinations.

By controlling in definite ways the character of the stimulus words, and by specifying in one way or another the character of the reaction desired, certain very interesting facts appear. For example, it is found that if a list of familiar words be given and the subject be asked to react with a word which designates a particular instance, falling under a class of objects or events, indicated by the stimulus word, the reactions will be materially faster than in the case of reactions made free from any such restrictions, Thus, if the word "lake" be given, the subject would react with such a word as "Michigan," or "Superior," when reacting in the restricted fashion. When unrestricted, "lake" might be followed by the word "water." The

greater promptness of the restricted type of reaction apparently indicates two things about mental organization; first, that the mind is built on systematic principles. A term which is definitely to be classified under another is therefore more likely to be elicited promptly in such reactions than a term which is less exclusively and necessarily subsumed in this way. In the second place, the fact appears to indicate that when a large number of ideas are equally relevant, there is a measure of competition among them which delays the final appearance of any particular one. If the number of related ideas be smaller, the appearance of any special one is likely to be more prompt because less impeded.

The association reaction has gained a somewhat factitious prominence by virtue of the effort to use it in the examination of criminals. The theory on which this procedure is based is that a stimulus word which calls forth an emotional state is likely to change markedly the normal rate of reaction and often to produce an obviously unusual association. It has been proposed to

subject persons under suspicion of crime to a series of reaction tests with lists of words in which there is occasionally introduced a term directly suggestive of the crime committed, or some of its attendant circumstances. If these terms produce an emotion in the reagent, the words with which he reacts are likely to betray his mental excitement by causing a delay in the normal time of his reaction, or by making subsequent reactions unduly prompt, or by introducing into the series of responses words obviously conjured up, and in no sense spontaneous. It is no part of our present purpose to criticize the validity of this procedure, either from the psychological or the legal point of view, although such criticism could certainly be justly offered. It is, however, undoubtedly true that emotional conditions effect very fundamentally the character and rate of such reactions.

Experiments of this same type have been put to another interesting use by alienists and specialists in nervous disorders. In this case an effort is made by the use of association

reactions to ascertain the presence of any suppressed emotional experiences about which evidence is desired, that cannot be obtained spontaneously from the patient, whether because of obstinacy, or because of loss of memory. In these cases the words are skilfully arranged to touch occasionally upon the common sources of nervous and mental disturbance, and thus through any betrayal in the reactions to enable the formulation of a diagnosis of the causative conditions, such diagnosis being confirmed and elaborated by repeated tests following the lines of suspicion previously indicated. No little success has attended this method in the hands of skilled operators.

The contemporary field of experimental psychology is so broad that one might go on indefinitely with illustrations of its problems and achievements. The ground touched upon may serve, however, to convey a general impression, although the writer acknowledges frankly the entire impossibility of doing more than indicate tendencies.

The question is often asked whether or not

there are ranges of mental experience from which experimental procedure is wholly excluded. If it be intended by this question to inquire whether there are particular experiences which have not yet been subjected successfully to experimental technique, one must unhesitatingly reply in the affirmative. An experiment, as has been repeatedly stated, is simply an observation made under conditions of control, and there are certainly typical instances of consciousness which we do not at present know how to subject to such control. For example, no one has thus far pretended to bring deep grief into the laboratory for scientific study, nor is it possible in this way artificially to produce the more intimate and delicate forms of personal emotion. The pseudo-emotions produced by literary description can, of course, be so brought about, but the great typical crises of human life do not as yet lend themselves to analysis which can pretend to be genuinely experimental. On the other hand, if the question be understood to be whether there are any fundamental forms of mental action

which have not yet been experimentally controlled, the reply is undoubtedly "no." Will, emotion, desire, feeling, memory, reasoning, attention, association, perception, sensation: these and all other fundamental processes of mind have yielded at one point or another to the patience and ingenuity of the experimentalist. What further victories lie before this method it would be audacious to predict. One thing is certain: it has in a single generation wholly altered the face of psychology and given it a place once and for all among the firmly established sciences. Incomplete and imperfect many of its methods undoubtedly are; but they contain within them the promise of unlimited improvement and unceasing conquest.

LECTURE IV

ABNORMAL PSYCHOLOGY

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THERE is a popular tendency to regard the more sensational achievements of a science as characteristic of the central interests of that science. Psychology has not been exempt from the results of this habit of mind, and consequently it happens that to many persons the term suggests the study of mediumistic phenomena, of telepathy, of crystal gazing, and similar things. One important branch of psychology has, indeed, interested itself in these matters, but so far as its undertakings have been guided by the competent, as distinguished from the amateur and the quack, it has taken a much wider view than is involved in the study of isolated instances of unusual mental experience. It has tried to bring under a few general conceptions a broad range of facts and has tried to find some basal principles for

their interpretation and explanation. These phenomena, which are marked off from those of everyday waking consciousness, extend from the familiar experiences of dreams on the one hand, to the extremest forms of insanity on the other. An exhaustive survey of this ground is clearly impracticable, and insanity in particular cannot be dealt with at all. But it is not impossible to gain some useful impressions of the remainder of the field, and to this result we may here devote a few moments.

It should be clearly recognized that our practical conception of normal consciousness is loose and inexact. All sorts of differences of opinion, belief, sentiment, and character are compatible with entire normality. The transition from the normal to the abnormal is gradual and not abrupt, and in designating any particular experience as "abnormal," we merely mark it as relatively unusual. If it lead to, or accompany, persistently depraved or incoherent action, we term it insane. But short of insanity there is a vast multitude of phenomena, many of which deserve a place

in our psychology, because they are unquestionably conscious, but which are foreign to the experience of the rank and file and must so be regarded as in greater or less degree abnormal.

Dreams afford, perhaps, the most natural bridge over which to pass from the mentally commonplace to the mentally unusual. They have played a part of prime importance in the history of all primitive peoples; folk-lore is full of dream omens, and no little superstition is still cherished in civilized communities concerning the significance of certain dreams. The history of dreams and their interpretations, as recounted in the Old Testament, is typical of the early beliefs and practices of all peoples. Joseph and the Pharaoh are symbolic of the universal confidence of pre-scientific man in the prophetic import of the dream. Through the dream has also come at least a part of the idea of possession by spirits, for it often happens that in dreams one seems wholly divorced from the self of waking life. Sophisticated modern theory has leaned in the same direction, attributing

the phenomena of dreams to the domination of subconscious influences, conceived sometimes as distinct personalities, sometimes as mere centres of submerged physiological tendencies. Thus one important group of specialists inclines to attribute all dream phenomena to sexual motivation which, being suppressed and inhibited to a large degree in waking consciousness, comes to its own in the dream state.

Practically every one dreams at some time, although there is the utmost variation among people, if we may accept their testimony, in the frequency with which they dream. Certain authorities maintain that we dream incessantly during sleep, forgetting most of the dream thoughts upon awakening. It is difficult either to prove or disprove this doctrine conclusively. On the level at which waking consciousness passes over into sleep it may be substantially impossible to differentiate between the revery of the drowsy state and the dream which succeeds it. But as sleep becomes a little deeper, the dream consciousness begins to take on more definite characteristics.

In its extreme departure from waking consciousness, the dream has several well-marked peculiarities. In the first place, save in somnambulism, resolutions and decisions are not carried out by appropriate movements. They are executed in imagination simply. Moreover, the power of making judgments in accord with the facts of waking life is largely dissipated. For the dreamer two and two make seven as readily as four. Again, there may be the liveliest play of fancy, and scenes and conversations quite foreign to the ordinary capacities of the individual when awake may be conjured up. The thoughts often run on as though directed from without. The dreamer is thus sometimes reduced to the position of a mere onlooker.

The causes of dreams are certainly many, although the exact facts are still not confidently determined in every instance. It is quite certain, however, that two main types of causes operate to start them. The one consists in the ordinary forms of sensory stimulation,—sound, light, temperature, and contact. Everyone can probably recall in-

stances in which a dream is found in full swing, which quite certainly had to do with the ringing of the rising bell. The other is found in intra-organic conditions. We have already called attention to the view that sexual influences are the dominating agents in dream causation. The nightmares of indigestion, or of disturbed circulation caused by a strained position, or of fever and pain, are familiar examples. It is quite possible that apart from either of these types of causes, the brain itself may carry on a mild form of activity tending to produce dreams. This might be correlated with slight alterations in circulation, and so fall again under the second heading.

But such causes have to do primarily with the *initiation* of the dream. What happens after the process begins is determined by the brain. The impulses may continue to pour in from the sense organs or from the viscera, but the interpretation which is given to them and which clothes and gives form to the dream, — all this is matter of the brain's action. Just what differences mark the action of the

brain in waking consciousness and in dreams, we do not know. It seems clear, however, that ordinarily in dreams its highest and most intricate mechanisms are not in operation. Certainly, the motor regions of the cerebral cortex are out of commission, and there seems some reason to think that the frontal regions also are relatively inactive. Meantime, the solid fact remains that once or more in every twenty-four hours all of us, practically without exception, exchange one type of consciousness for another one in many essentials quite different.

From dreaming to hypnosis is a very short step, and we may profitably spend a few moments in discussing certain features of this latter condition. In modern times it has been known by many names, — among others, mesmerism, electro-biology, Braidism, all of which are merely different titles for one and the same thing.

Like the dream, hypnosis has played a very important part in the history of mankind and is in evidence among primitive peoples as far back as records are available.

It is met with in the history of all the great religions, and has played a part of signal moment in many contemporary religious movements. It is accordingly not to be regarded as a mere appendage of the vaudeville, or a mere perquisite of the pathologist.

The most celebrated controversy concerning the essential nature of the phenomenon since the period of its scientific study, was waged by the two eminent French physicians, Charcot and Bernheim. The former regarded hypnosis as a symptom of hysteria, and therefore as essentially a mark of disease. Bernheim, on the other hand, held that it was a condition producible in perfectly normal individuals by suggestion. The latter view has come generally to prevail, and skilful hypnotizers report some degree of success in almost all mentally normal persons whom they try to hypnotize. Persons seriously deficient mentally cannot easily be hypnotized, and no normal individual can be hypnotized against his will.

Various methods and devices are employed to bring on hypnotic sleep, but they all

involve one and the same principle, i.e., the fixation of attention upon some monotonous form of stimulation. Some operators ask the patient to stare at a bright object held between, and somewhat above, the eyes. Others have their patients listen to the ticking of a watch or a metronome until fatigue sets in. Still others "talk sleep," instruct the patient how to relax one after another of the muscles of the body and then describe in a soothing manner the pleasant experiences of falling asleep. One method will sometimes succeed when others fail. Generally speaking, the methods like "talking sleep" which involve least strain upon the organism, are to be preferred, inasmuch as there is less likelihood of unpleasant after-effects.

The mental consequences which ensue under the influence of suggestion may be roughly summarized under three main heads — sensory phenomena, memory phenomena, and volitional alterations, premising this statement with the remark that perhaps the most striking feature of the entire situation is the astonishing condition of dependence

of the patient on the operator, known as "rapport." Broadly speaking, only the operator has access to the patient's mind which is thus under his control, subject to certain limitations to be mentioned shortly.

The changes in sensory activities are of several kinds. By making the appropriate suggestions the sense organs may be rendered seemingly quite insensitive to stimulation. For example, the skin may become impervious to the pain of burning or pricking or cutting. So true is this, that minor operations have been successfully conducted with hypnosis as an anæsthetic. On the other hand, suggestion may be used to augment the normal sensitiveness of the sensory processes. Sounds or lights so faint as ordinarily to escape detection, may be discerned. Again, the most marked illusions or hallucinations may be produced. A perfectly blank page may be described as containing a photograph which the patient forthwith asserts that he sees and thereupon describes. An interesting effect of the opposite kind is often attained by telling the patient that a certain person

has left the room, who is, as a matter of fact, still present. Whereupon, if asked to count the people remaining, the patient will always report one less than the real number.

The interpretation and explanation of these phenomena has led to much discussion and to wide differences of opinion. But the essential accuracy of such facts as we have described is hardly open to question. Not every operator will succeed in producing exactly the same results with every patient, although there is no reason to suppose that the operator must possess any magical or mystical powers. Like any other skilled performer, he must know his business thoroughly.

The changes produced in the memory are very interesting, although more complex and less easy to present fairly in a few words. If the sleep has been deep, the patient upon awakening is likely to remember little or nothing of the occurrences during his slumber. After a time these may begin to come back, and under persistent interrogation a large part of the events may be recalled, though

as a rule with no great assurance of the correctness of the memory. Oddly enough, however complete the forgetfulness during waking consciousness, the patient in a second hypnotization may remember with entire distinctness the events of an earlier hypnotic state.

Another most interesting phase of the memory action is found in the fact that during hypnosis the memory of events which have been totally lost to the waking consciousness may be restored. For instance, events of early childhood, which have quite vanished from the normal memory, may be re-instated. This fact has been of the greatest value in the medical treatment of many forms of nervous and mental disorders, by enabling the physicians to ascertain the original cause of the trouble and thus to set on foot remedial measures adapted to the needs of the special case.

Perhaps the most striking feature of the modifications of memory is contained in the phenomenon known as "post-hypnotic suggestion." Whatever the explanation, cer-

tain of these cases present a most weird and mystic appearance. Much of the therapeutic value ascribed to hypnotism in the treatment of nervous troubles is based on this principle.

A patient is told, for example, that two weeks from the present moment he will go to a certain druggist and buy a dozen nursing bottles. Upon awakening, the patient may have no recollection of having received any such instructions. Nursing bottles may also be for him most utterly unnecessary possessions. The druggist in the case may reside in a part of the city quite remote. Nevertheless, at the time set, the patient will be found at the spot designated, engaged in the purchase of his bottles. Moreover, he will almost certainly have evolved an ingenious justification for his act, and one which, to his own mind at least, will appear convincing and plausible.

By taking advantage of this characteristic of hypnosis, and suggesting that at a given time certain bodily symptoms shall be present or absent, astonishing results have at

times been obtained in checking abnormal nervous phenomena and replacing them with healthy ones. One may be thus instructed to forget certain morbid or distressing thoughts which have been tormenting one's mind, to think no more of one's anxieties and worries. Not infrequently such commands or suggestions are effective, temporarily if not permanently.

The correct explanation of these post-hypnotic cases is still matter of controversy. The advocates of belief in subconscious personality explain the facts by reference to the interposition of such a personality. Others maintain that such explanation explains nothing, but simply describes the facts in new terms. Whatever the true explanation, the phenomena themselves at least make it clear that the influences to which we are exposed and to which we yield, may often transcend, or lie quite outside, the range of our ordinary every-day consciousness.

Not less remarkable are the effects exercised by hypnotic suggestion upon the volition of the patient. Indeed, the previous

illustration concerns the will quite as much as the memory. Here one meets with two extreme impressions among the laity, both of which are undoubtedly incorrect. On the one hand, it is sometimes supposed that the hypnotized person becomes forthwith *entirely* the creature of the operator, whose commands and suggestions will be obeyed unhesitatingly, and without exception. From the opposite standpoint the whole situation is histrionic, the patient never does anything save with knowledge and consent, he knows all that he does is mere acting and goes through with it as a kind of game.

As regards the latter point it is perhaps sufficient to call attention to the cataleptic condition which can be hypnotically produced. The muscles may be given a rigidity quite abnormal, and not within the power of the patient to produce voluntarily. The stock illustration of this, commonly exploited in stage exhibitions, is the rendering of the skeletal muscles rigid by suggestion, whereupon the patient is suspended by his head and his heels between two chairs, the rest

of his body being without support. Several persons now mount upon him, and still the muscles do not give. This feat can hardly be attributed to histrionic capacity.

On the other hand, nothing is more certain than the fact that under ordinary conditions the range of suggestions to which a patient will respond obediently is circumscribed by definite limitations. A patient may go through with all sorts of absurd performances, only to balk at the first intimation of an act which his personal standards would mark as indecent or as morally wrong. Even the suggestion of indelicacy may cause obvious resistance and discomfort.

No doubt there may have been cases in which crimes have been committed as a result of hypnotic control. But it may well be questioned whether in such instances the one individual had not such an ascendancy over the other, as to render possible the successful provocation to crime, quite apart from hypnosis.

Such limitations aside, the control over the muscular system, which may be secured under

favorable conditions, is often amazing. The muscles may become flabby and inert, essentially paralyzed, or, as indicated above, they may become tense and rigid and abnormally powerful. Even the involuntary muscles and the glandular system appear to be more or less accessible to hypnotic suggestion. The peristaltic reflexes, for example, seem to be capable of such control to a certain extent. Moreover, the evidence is measurably satisfactory that blisters have been caused by suggestion. Such phenomena, if well attested, afford an interesting suggestion as to the manner in which the stigmata of the saints may have been produced. In this case, however, one must look to auto-hypnosis, which is apparently a *bona fide* state, resembling hypnosis in many particulars, but brought on by the independent personal effort of the subject and without the help of a hypnotizer.

Auto-hypnosis and auto-suggestion are generally managed by assuming a convenient bodily attitude and then repeating again and again, *sotto voce* or aloud, the thought whose

consequences it is desired to implant. If the aim be to overcome insomnia, the subject may repeat to himself many times over, "I am getting drowsy. My mind is at rest. I am going quietly to sleep." With certain individuals this procedure results successfully. The time-honored "counting sheep jumping over a fence" as a method of wooing Morpheus evidently reposes on the same psychological foundations, and has, it may be added, a similar practical value, sometimes succeeding and sometimes failing.

Similarly, the Hindu saint gazing for hours at a time at the pit of his own stomach, chanting betimes holy phrases, succeeds in getting himself into a condition of trance which may properly be recognized as auto-hypnosis. To this same order of events must be added much of the "crystal-gazing" business. One stares at the crystal fixedly, and after a time a flow of visual images ensues, often of a highly picturesque character.

Like dreaming, hypnosis reveals how slight a departure from our ordinary circumstances may radically alter the workings of our minds.

A little more pressure here, a little less there, and the entire balance of the machine is destroyed. It may still run, but the character of its output is totally changed.

The study of hypnosis leads us naturally into some account of the phenomena of multiple personality. Not only is the presence of certain of these submerged personalities suggested by the facts disclosed in the study of hypnotism, hypnosis has also been used as one of the most successful and indispensable of agents in analyzing these multiplications of self.

Although bearing some resemblance to one another, the multiple personalities of abnormal psychology must not be confused with the familiar moralistic vagaries of character of which Dr. Jekyll and Mr. Hyde are exemplars, nor yet with those more familiar transformations of daily life, from the stern master of cringing hirelings to the gentle and affectionate father, from the obedient and loving son to the loud-mouthed leader of a brawling gang. In so far as both sets of facts indicate that within one and the same human being are

possibilities of most divergent and dissimilar conduct, they are related to one another. But in other respects they are generally quite distinct.

For purposes of description, multiple personalities are sometimes divided into successive and simultaneous. In the case of successive personalities, the phenomena may be of the following kind: A certain John Brown wakes up on a Monday morning and finds himself utterly devoid of all memory of his past life. He starts in afresh, perhaps adopting some entirely new name, is lost sight of by his friends, and suddenly, some three months later, comes to himself, regains his old memories, finds himself possibly a thousand miles from home and does not know how he got there. During his secondary state his temperament and character may have been quite different from those known to his former friends, and when he is restored to his original mental status, the old traits are likely to come back.

In simultaneous multiplication of personality, there is likely to be the same diver-

gence of temperament and character, something of the same discrepancy of memory. But now these phenomena, instead of being encountered at temporally distinct moments, cohere in some way in the same individual at the same time. It is difficult to portray to oneself just what the real condition of mind may be in these cases, but a brief statement of one method of securing the data may serve to render the situation more intelligible.

Suppose a person of this type to be reading a book or to be conversing with you. If a pencil be placed in the subject's hand and some question be then whispered in his ear, perhaps by a third person, the hand may write down an answer while the reading or conversation goes on quite undisturbed. Moreover, after the writing is complete, the patient on being questioned in the ordinary way, may deny absolutely all knowledge of what he has written, or indeed, of the fact that he has written anything. And not only so: the experiment, if carried further, may lead to the expression through the hand of sentiments and beliefs well known to be

abhorrent to the individual's normal mind. Furthermore, it may prove possible to tap through the hand, stores of information otherwise quite inaccessible to the person's memory, just as can be done in hypnosis.

This automatic writing will remind many persons of the planchette and the Ouija board with which they may have written. The performance is distinctly similar in character, although in ordinary persons it is generally quite impossible to secure any considerable amount of connected and coherent response. The writing is commonly fragmentary, iterative, petty, and somewhat irrational. For the benefit of any who may be unfamiliar with these devices, it may suffice to say that the planchette is simply a little platform moving on marbles set on a glass plate, and carrying a crayon which marks upon the plate or upon paper spread over it. The performer's hand is allowed to rest upon this platform, which moves very easily, and then while his mind is ostensibly engaged with other things, the hand will sometimes write words and sentences. In the typical form

of the test, the reagent has no sense of guiding the hand and is quite ignorant of what has been written.

The splitting of memory in multiple personality may go on indefinitely, four or five or even more personalities emerging under analysis, each as a rule independent in some measure of the others, but certain ones assuming ascendancy. As reported in some cases, the relations of the several memories to one another resemble the nests of Chinese boxes. Of a series of four personalities, for instance, the memory of one may include the experiences of all the others. The memory of the second may include that of the two inner ones, but be excluded from the experiences of the first.

Such dissociations or disintegrations of personality are generally held to be phenomena of the disease unfortunately known as hysteria and formerly supposed to be an exclusive property of the female sex, a supposition now known to be quite unsound. The dissociation seems always to be connected with a shock of some kind or other,

against which the organization of the individual is not able to stand. Even if restored for a time to a stable unity, as has apparently occurred on occasions, such persons are inevitably unstable, and unless very carefully guarded, are likely once again to fall apart mentally. They furnish another interesting instance of the perturbations to which consciousness is susceptible under proper conditions, which still leave it essentially intact for the execution of ordinary mental tasks. A person suffering from one of these divisions of personality might be quite incapable of carrying out a prolonged business enterprise, because the management might change hands several times while he was engaged upon it, and the second manager, to say nothing of his successors, might not know what the first had done, or might not approve it, if he did know. Yet each mental operation of each of the managers might itself be intrinsically sane, and express in an effective manner the tastes and beliefs of the self temporarily in charge.

These cases of multiple personality have

probably figured to no small extent in fostering belief in demoniacal possession among primitive peoples. It has commonly been supposed that nervous disorders were largely luxuries of civilization, but evidence is accumulating from the careful study of primitive peoples which renders it reasonably certain that this conviction is ill-founded. In any event, it is clear that multiple personality would give abundant ground for belief in spiritism and demonology of one form or another.

Historically, spiritism, or spiritualism, is one of the oldest of doctrines. In its earlier forms it hardly rises above superstition. In its modern forms, although still contaminated with all kinds of occultism, it nevertheless makes a pretence of putting itself upon a scientific basis, it submits to and even invites all sorts of scientific tests, and the upshot is a vast literature teeming with trivial futilities whose import baffles impartial judgment. In its most interesting modern expression it is identified with the study of a few peculiarly organized individuals known sometimes as mediums, sometimes as psychics.

These persons appear to be endowed with the power of entering on a condition known as "trance" in which they allege themselves to be serving as the mouthpiece through whom the spirits of deceased persons speak in reply to questions asked them. Sometimes these messages are transmitted verbally, sometimes by writing. In either case the medium is, or affects to be, in a semi-comatose state, and after a prolonged sitting is likely to give evidence of great exhaustion, sometimes of headache and nausea.

To say that the larger part of all the phenomena alleged to be mediumistic trance is cold-blooded fraud, designed to prey upon the pocket-books of credulous persons, is to state only a commonplace. A mother grieving for a lost child and led to believe that she may again communicate with that child, is not likely to make a drastic critic. On such many of these mediumistic harpies prey. On the other hand, there is good reason to believe that to a certain extent the phenomena reported are genuine, in the sense that they are not the results of intentional fraud.

What interpretation they are to receive is quite another matter. The most irreconcilably contradictory views are held by persons *prima facie* equally competent to form a sound judgment.

One group of investigators, men of scientific training and ostensibly disinterested, maintain that the evidence is conclusive in its indication that the spirits of deceased persons live and may communicate with us, granted the peculiar conditions represented by the "psychic." Over against these is another group, and here are found almost without exception all the experimental psychologists, who regard this alleged evidence as intrinsically worthless, urging that it has always proved fallacious whenever submitted to the ordinary canons of science, and who rail at the entire spiritistic movement as being honey-combed with repeatedly demonstrated fraud. Under such circumstances one must either master the evidence for himself or hold judgment in suspense.

A somewhat similar situation characterizes the state of opinion about telepathy,

which is a name for a group of alleged phenomena often met with in spiritualistic trance as well as elsewhere. Broadly defined, telepathy is a term used to designate the transfer of knowledge from one mind to another, without the intermediation of the ordinary sense processes. Normally, if I am to convey an idea to you, I must embody it in words or some other physical form, in which it may impress your eyes, or your ears, or some of your other senses, whereupon your brain is stimulated and in your consciousness appears what you call my idea. In telepathy, according to hypothesis, this intermediary process of muscular movement on my part and sense activity on yours is short-circuited, and my idea suddenly makes its appearance in your mind without more ado.

It seems a great pity, if this telepathic method be genuine, that we cannot make use of it. Think of the labor saved for the hard-worked teacher and the lazy, obstinate, or stupid pupil. Instead of a fatuous and futile struggle to make clear the point and stamp it into the mind, the teacher might mix up a

little dose of telepathy, fix her mind on the idea to be communicated, and, presto! by a kind of psychic inoculation the recalcitrant youth has the notion safely stored away in his head.

However, telepathy is not to be laughed out of court merely by ridicule. There is a very respectable body of evidence tending to show that, occasionally at least, such transfer of knowledge has occurred. How it comes about, why it does not occur oftener, why it does not occur when we long prodigiously to have it, why it often concerns trivial matters instead of serious ones, whether it may not have a purely physical basis (possibly something on the order of the X-ray), these and many other questions have at present no satisfactory answers, and, moreover, as is true in the case of spiritism, the rank and file of scientific psychologists probably disbelieve vigorously in the reality of anything except occasional coincidences, such as are met with in all the aspects of nature. Lightning, for example, does strike twice in the same place, popular proverbs to the contrary notwithstanding. With millions of people

incessantly at work thinking, what more natural than that there should be some remarkable coincidences? It is fair to add that with persons experimenting in the same room, unconscious whispering has been proved, on certain occasions at least, to be responsible for the "telepathic" results gained.

The last sentence naturally calls to mind the wonders of muscle reading, a group of phenomena undoubtedly remarkable, but in no final sense mysterious. There are various modes of bringing out the facts, but all rest on one and the same principle, namely, that if we fix the mind firmly upon a given thought, we tend inevitably to express the thought in appropriate movements. Muscle readers become extremely expert in detecting and interpreting these movements. Such a person by putting his fingers upon your forehead can tell, by the unconscious motions that you make, the point of the compass of which you are thinking.

No doubt the most important doctrine which has come out of the contemporary interest in the abnormal, the subnormal, and

the supernormal, is that of the *subconscious*, and the possibility of dealing with it through suggestion. This subconscious has been conceived in various ways, some of which are certainly open to serious objection. Not infrequently it is referred to as though it were a sort of homunculus, hiding elf-like beneath the surface of things, and waiting for an unobservant moment on the part of the lord of the manor to run out and work some mischief. This conception travesties a trifle a very common view of the matter, but it is sufficiently near the truth to suggest at once certain of the absurdities and difficulties which are involved. The topic is too complex to expound completely within the limits of time at our disposal. But we may hazard a few brief statements in the effort to characterize the positive and useful features of the doctrine upon which practically all are agreed, however divergent their formulæ for presenting the facts.

We are so organized that, apart from the influences which originate in the field of consciousness, we are constantly under the im-

pulsion of motive powers which surge up in us from depths which we may have neither occasion nor capacity to fathom. These impulses are in part such as sound in us the call to racial fidelity. We tend to do again the things our forbears have done for millions of generations and these we call reflex acts and instincts. In no range of experiences is this group of traits more obvious than in the irradiations of the heritage of sex, coloring, as these do, our religion, our morals, our art, and our politico-social institutions. In part, these impulsions are such as spring from our own past experience, both conscious and unconscious. But whatever their origin, they may intrude themselves subtly and unannounced into the midst of our most important decisions. They may force themselves in upon our less watchful moments and set up habits whether for weal or for woe. They may enter into our attitudes of mind to create prejudices or prepossessions, and quite irrespective of measured or well-considered grounds.

At any given time, therefore, while a large

part of our character, our beliefs, and our ideals may be the product of our own serious reflection, another, and perhaps the larger, part is made up of essentially blind impulsions which, if fate has dealt kindly with us, may cause our days to be happy and fruitful; but if she has dealt harshly, may render us the victims of innumerable ills, primarily mental, but secondarily physical and social.

It is the recognition of the significance of this aspect of our organization, and its import as a causative factor in nervous disease, which has given the contemporary movement in psycho-therapeutics its revolutionary character. It has been found that by suggestion and training of different kinds, the victim of mental and nervous affliction of various sorts can be so re-educated as to give all these subterranean forces a tilt toward health and happiness and efficiency, in place of the bent which they may have developed in an opposite direction. When such training is conjoined with a full development of the intelligence of the conscious and reflective person, the results are as amazing as they are welcome.

If time permitted it would be interesting to scan however hastily the leading conceptions of modern psychiatry. But this undertaking we must forego. Suffice it to say that scientific medicine has few more honorable achievements to its credit than the complete revolution which it has wrought within the last generation in the care of the insane and in the scientific study of the causes which produce insanity. As a welcome consequence of this work, there is rapidly spreading among intelligent persons a more humane and rational attitude toward insanity, which is primarily a *disease* to be treated like other diseases — preventively wherever possible, curatively where prevention has failed.

LECTURE V

INDIVIDUAL AND APPLIED PSYCHOLOGY

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INDIVIDUAL AND APPLIED PSYCHOLOGY

I. — Individual Psychology

INDIVIDUAL psychology enjoys a plethora of names. It is often called variational psychology, and again differential psychology. But whatever it is called, substantially it consists in the attempt to portray the mental traits peculiar to a given individual, and from this to work out toward the delineation of psychic types. General psychology contains the specifications for mind, as such. Just as anatomy tells us what are the proper characteristics of the human body — eyes, nose, mouth, and what not — and as physiology describes and explains to us something of the proper operation of the same, so general psychology offers us on the one hand an anatomical sketch of mental organization, and on the other a description

of the operations of the mind in its normal character. In distinction from this task, individual psychology attempts to show how much of one trait is combined in a special person with how much of another, to show exactly what special form of a general trait is actually present, and, in short, to afford a kind of mental photograph.

The methods used for this purpose are essentially those we have become familiar with in earlier lectures. They are now used to isolate and emphasize differences which separate individuals from one another, rather than to determine averages and general principles. A brief account of some of the concrete findings will, we may hope, serve to clear up whatever is vague in this descriptive characterization of the field.

It is a matter of common knowledge that persons vary greatly in the sensitiveness of their sense perceptions. This general field of variability in sensitiveness has been carefully studied and several kinds of interesting facts have been discovered, which are not ordinarily recognized. In the case of vision,

for example, it is perfectly well understood that persons vary in the distinctness and clearness with which they see, and these differences are most often referred to the relative perfection of the refractive mechanism of the eye. That a similar difference in the capacity to distinguish colors from one another is equally common, is not generally appreciated. Color blindness, to be sure, as a pathological fact, is well known; but it is not widely understood that between normal vision for colors and pathological color blindness there are numerous stages of defect which render persons insensitive to many niceties of hue and shade.

In the case of hearing, again, everybody knows that elderly people are less acute than children, and the wide variations in the keenness of hearing of different individuals are perfectly familiar. It is not usually recognized that a similar distinction marks the capacity of different people to distinguish notes of different pitch and tone quality. Nevertheless, this is the fact, and not a few of the so-called "unmusical persons" are unmusical

primarily because they cannot thus distinguish with certainty normal musical intervals.

These instances suggest variations chiefly in the direction of defect and sub-normality. An opposite type of variation, giving rise to hyper-sensitivities, is also encountered. In the pathological form this is quite familiar in the case of undue sensitiveness to light or to sound. But the abnormality in these cases is ordinarily connected with the unnatural sensitiveness to pain, rather than with any capacity to detect sounds or colors of lower intensity than normal individuals are able to perceive. Quite apart from these neurasthenic cases, there are many instances of slight hyper-sensitiveness, some of which are apparently native in character, and some of which are seemingly the results of long discipline, as in the case of wine-tasters, tea-tasters, and other experts in condiments of various kinds.

Not the least curious of the facts which are disclosed by a study of individual variation in sense processes, is the following: A given individual may possess perfectly nor-

mal sensitiveness to all ordinary forms of sensation, when his attention is directed to them, and still show a marked preference for one as against the others. This one may be vision. In such a case stimulations of sound or of contact or of temperature will possess little or no power to gain his notice, whereas visual objects will attract and hold his active and interested attention. We shall encounter a similar peculiarity in a few moments, when we come to speak of memory and imagination.

It requires no sophisticated mind to recognize that variations such as those described in the preceding paragraphs must be due in part to diverse organization in the sense organs. Deafness and far-sightedness would illustrate this case. Others of the variations presumably have their basis in the peculiar formation of the brain or other parts of the central nervous system. This is probably the case in the instance just mentioned, describing the preference of particular persons for special kinds of sense stimulation, despite the entire normality of all their sense

organs. Broadly speaking, it is to be recognized that the margin of variation in the sense activities in the case of the great mass of essentially normal individuals is relatively small. The divergences in mental traits become rapidly greater as the complexity of the mental process increases, and the simpler and more concrete operations of the senses disclose a minimum of variability.

Another interesting field of study is that of memory, which discloses a wide range of variations, part of which have to do with the substance of the memory, i.e, the mental material which it employs, and part with its tenacity and reliability. Practical experience teaches us not a little regarding the variations of the latter kind. But a more concrete and scientific study reveals the character of the differences with much more of precision and detail. Experimental tests show that persons may be roughly grouped in one or other of the following classes as regards the quickness with which they acquire and the persistency with which they retain impressions in memory: There is,

first, the person who learns quickly and who forgets with almost equal rapidity; second, the person who learns promptly and retains permanently (or practically so); third, the person who learns slowly and who retains well; and fourth, the unfortunate individual who learns slowly and even then fails to retain. It will be readily recognized that Class I and Class III are the common and familiar types. Class IV trenches on the field of the pathological, and Class II contains for the most part only persons of such rare talent as to verge upon genius.

Experimental or introspective observations have served to establish the existence of wide variations in the materials employed for memory. Some individuals recall almost all their experiences in terms of visual content, or see the object in the "mind's eye," tending to have what the psychologists call visual images. Others tend to recall their experiences in the form of words which they hear running through the mind, as though one were listening to a speaker. The speaker's voice may sometimes be the voice of the indi-

vidual himself, and sometimes it is a strange voice. Other persons recall their experiences largely in the form of motor "feelings" or images. They feel as though they were, in a measure, going through, in muscular form, the events which they recall. These and many other varieties of memory processes are instantly discovered, when a group of people is carefully scrutinized. Indeed, the situation is even more complicated than this brief description would indicate, because one and the same person may avail himself of one form of memory by means of which to recall a given kind of event, using a quite different form in order to recall a different type of occurrence. For example: In recalling a musical score an individual may make use of auditory materials, hearing the melody as though he were singing it mentally; whereas to recall the location of a misplaced object, he may avail himself of the most distinct visual imagery.

When observations of the type first mentioned, i.e., those having to do with rapidity or permanency of memorizing, are surveyed

in conjunction with observations of this second type, dealing with the materials of memory, one finds again the utmost variation in different individuals — variations which connect themselves in an interesting manner with the diversities of sensory capacities referred to at the opening of the lecture. Thus it is found, for example, that certain individuals can memorize much more rapidly if the material to be learned is presented to the eye rather than to the ear. Others invert this preference. It might seem to follow that if an individual learns most readily by hearing, he would tend to recall the material learned in terms of sound; that is, in most cases he would be likely to have the sounds of the words pass through his mind. As a matter of fact, this is not necessarily the case. An individual may learn most readily through the ear, and still tend to convert the material learned into some other form, such as visual. This conversion of a preferred type of sense material into another preferred type of mental material is perhaps not very common, but

it seems quite certainly to exist. Moreover, it does not follow that the form in which one learns most quickly — it may be, for example, through the eye — is necessarily always the form in which memory is most tenacious. Indeed, it may be true that the greater effort required to secure control over material by the use of a less preferred sense, may result in a more enduring mastery of the material thus gained.

We are entirely at a loss to assign any convincing reason for the preferences which individuals disclose for the use of one kind of memory material rather than another. We assume that it is presumably due to the more sensitive organization of those portions of the brain which are responsible for the preferred type of learning. It also seems highly probable that certain of these preferences are cultivated rather than native. On the other hand, experience seems fairly conclusive in its indication that with some people there is no capacity whatever for certain types of memory. It seems to be well established, for example, that some individuals

are entirely devoid of musical memory. In certain of these instances, no doubt deficiencies in the structure of the sense organs play a part, as has already been suggested. But such defects are entirely inadequate to account for all of the peculiarities which are encountered, and for most of those we have described, explanation must be sought in brain conditions.

In connection with memory, it is very natural to speak of the variations which are found in attention, inasmuch as the accuracy and tenacity of memory is related in the most direct and intimate manner to attention. It may suffice to mention simply those forms of variation which are familiar in common experience.

There is the individual whose attention under normal conditions is highly stable and can be at will directed in the most fixed and concentrated manner for long periods of time to a given task. Attention of this character is an essential pre-condition of practically all forms of human efficiency on a large scale. It may be doubted whether

lacking this capacity in a reasonable degree, any person has ever achieved high distinction. On the other hand, there is the type of attention which is distracted on the slightest provocation, and is rarely, or never, concentrated for any considerable time. Subdivisions of each of these varieties may be recognized. Attention may be concentrated and fixed in a practical sense, without possessing the violent intensity which sometimes belongs to a more fleeting and unstable form of attention. Thus, maniacs often have very vacillating but intense attention. On the other hand, it is generally true that attention which oscillates rapidly from topic to topic is superficial and not intense, as is illustrated in certain neurasthenic conditions.

Another distinction in attention which psychologists have often made, to wit, attention to sensations and attention to ideas, corresponds roughly to differences which are found marking off individuals from one another, although the distinction did not grow out of the study of individual variation. Some individuals are attentive throughout

far the larger part of their waking hours to *ideas* and to *thoughts* with which their minds are busied. Other persons rarely pursue ideas for more than a few moments at a time. They live for the most part in a mental world of sensations and perceptions and the ideas momentarily suggested by them. The things which they see or which they hear are the things to which they really attend. This difference is well illustrated by the mental habits of two types of persons when walking along the streets. The first type is practically oblivious to everything seen or heard upon the highway; for the other, nothing is so trivial as thus to escape notice.

The peculiarities of attention call naturally to mind an interesting group of variations in suggestibility. It is at present less easy to divide people into definite groups, as regards the possession of this trait, than in the case of memory; nevertheless, there are wide divergences, the extremes of which may readily be characterized.

On the one hand, there is the individual who reacts negatively, so far as possible, to every

suggestion offered him. If it be intimated in his hearing that a given substance is gold, his mind instantly leaps to the conclusion that it is certainly brass; and if he be told that a distant object on the horizon is a balloon, he is forthwith confident that the object is simply a tree. Every large family has at least one candidate for this class. At the other extreme from this type of mind is that which is disposed to assent instantly and without question to every suggestion, whether given verbally or by the mere force of surroundings. This essentially docile type of mind is often seen in children, and occasionally in women and girls; less often, perhaps, with boys and men. In any case, it is a very real type, leading to characteristic forms of mental development. Between these groups falls the mass of mankind who, on occasion, react negatively and on other occasions positively.

The mention of reaction may call to mind the description of the reaction experiment in the third lecture. It will be remembered that the phrase is applied to the execution of a muscular movement of some kind in re-

sponse to a sensory stimulation. The hand may be moved at the instant a certain color is seen, or a certain sound is heard. In this field, also, individuals vary in the most striking manner from one another, not alone as regards the promptitude with which they are able to make such movements, but also as regards the mental processes which precede and condition the movement. That persons vary in the quickness of muscular movement is, of course, the most familiar of facts; that they vary so widely in the *manner* of willing such simple movements, is as remarkable as it is generally unrecognized. The details of these differences are indicated in the lecture already referred to [page 102]. The interesting and essential point is that one and the same movement may be controlled through a considerable variety of mental cues.

The diversities which characterize the speed of the external muscular movements are reflected in similar diversities in the rate at which the mental processes themselves run along. It is perhaps not possible to speak with confidence of the extent to which the

normal rate of bodily movement is to be identified with the rate of flow amid the trains of thought. One thing is certain, however, i.e., that individuals vary within wide boundaries in this respect. It is also impossible at the present time to formulate any confident correlations between the rate of thinking and the value or solidity of thought. The slow thinker may be the effective and concentrated thinker, or he may be the merely fatuous thinker; the quick thinker may be subtle and accurate, or he may be simply flighty and erratic.

The matter of efficiency in thought raises the question which has been experimentally investigated with suggestive results, i.e., how mental energies distribute themselves over the twenty-four hours. Probably every one who is accustomed to working a considerable number of hours every day has noticed that he works to better advantage at certain periods of the day than at others. It is a familiar observation of students that certain of them can study to far better advantage at night than during the day. This is some-

times attributed to greater quiet and to more freedom from distraction, but in many cases it appears to be partly due to other causes. In any event, the investigations referred to make it reasonably clear, that whether or not the results are ascribable to habituation, the morning, the afternoon, or the evening, may be preferred by a given individual, in the sense that in that period he can do his most effective work. It is also to be added that persons have found it possible to do one type of work during a period of the day when work of a different character can be carried on only with great difficulty. The rhythms of mental energy connected with food and sleep are open to the most casual verification. With most persons the work done in the latter part of the morning or in the late afternoon is less effective than that done earlier in the half-day period. For night workers there is a similar high point of efficiency early in the evening hours, which, as the labor progresses, decreases more and more until exhaustion or serious fatigue sets in, to be relieved by sleep.

More familiar than most of the variations just described are those of emotional temperament, four varieties of which have been recognized as classical, i.e., the sanguine, choleric, melancholic, and phlegmatic. However crude these differentiations may be, they serve at least to indicate certain lines of divergence among individuals which we are all quick to recognize in our practical dealings with other human beings. They would be identified more easily if connected with the expressions of temper, as it is proper enough to do. The sanguine person is supposed to be easily aroused, but his feelings are of a relatively colorless and feeble kind. The choleric person is also easily excitable, but his emotions are strong and his feelings keen. The melancholic individual is slowly aroused, but feels deeply and is persistent in his mood, once he is stirred. The phlegmatic person is stimulated with difficulty, and never is moved to profound or lasting excitement.

These descriptions may serve to make clear the field of individual psychology, and to indicate how, by securing a sufficient amount

of such evidence we may hope in time to identify and formulate the main *types* into which the human mind is presumably divided. We recognize readily enough that conduct varies and character varies; that tastes vary and that prejudices vary. These differences all touch us at practical points which make them obvious. That the mind varies in all its other manifestations in just the same way is not generally recognized, but the fact is made abundantly evident by studies of the kind to which we have just been referring. Clearly, investigations of this character promise to afford a valuable supplement to the principles of general psychology, furnishing a concrete exemplification of the manner in which the phenomena considered are combined and distributed in the world of mind.

II. Applied Psychology

The study of the individual leads very naturally into the fields of applied psychology, where one has to deal for the most part with the particular human being and

the peculiar traits which he may present. One wide-spread misconception may well be corrected at the outset. A good deal of current writing suggests that the psychologists, having discovered certain principles, sally forth to impose them on various practical enterprises. No doubt there have been instances in which such a conception was justified. But in general it quite reverses the real case, and belies both the attitude and the spirit of the psychologist. Certainly, in the more important aspects of applied psychology, the psychologist is not so much exploiting ready-made generalizations forthwith to be incorporated in general lines of procedure as he is offering a method for ascertaining essential information. The truth of this assertion can be better understood after a few illustrations of the present situation.

The most important fields in which the attempt has been made to apply psychology are law, medicine, education, business, and industry. It is not possible in the time at our disposal to enter with any fulness upon the facts in each of these fields, and we must

content ourselves with dwelling on one or two as fairly typical of the others.

Educational psychology affords a peculiarly good instance of what is at once best and most definitely modern in the application of psychology. A generation ago the ordinary schoolman would have understood by educational psychology a statement of the general principles of mental life as these are represented in, and related to, educational practices. There would have been a formulation of general principles on the one hand, and on the other an effort to derive from them certain practical inferences which could be given application in the organization of the school curriculum, or in the actual business of teaching in the class room. Unfortunately a good many persons, critics as well as would-be defenders of educational psychology, have not gotten beyond this antiquated misconception. At the present time the conception of educational psychology is immensely more vital than this, and has little or nothing to do with framing practical deductions from general psychological principles. Instead of

this, the educational psychology of to-day is putting into the hands of educational experts methods for determining exactly what mental processes are being used by the child in the work of education, and how these are being changed or developed by different modes of treatment in the school. All this means giving the school authorities reliable scientific knowledge in place of impressionistic prejudices concerning the actual results achieved by the school. In place of the vague and intangible generalities of the earlier brand of educational psychology, the present variety is prepared to face such practical questions as the relative advantages of two or more competing methods of teaching reading, or writing, or arithmetic, with the purpose not only of ascertaining in a scientific way which is really preferable, but also why it is preferable. This statement may suffice to indicate, in this single instance at least, what was meant in the earlier paragraph when it was stated that applied psychology concerns itself in large measure with the supplying of adequate methods for gathering needed data.

In the case of medicine a somewhat sharper distinction needs to be drawn, in the interest of a clearer comprehension, between the medical study of mental abnormalities, which has often been called medical psychology, and the use of psychological methods for the study of nervous and mental diseases. The latter is, properly speaking, the only thing to be taken into account when one is considering the applications of psychology. Moreover, it must be clearly recognized that the larger part of the knowledge available in this direction has been gained by scientists who regard themselves as physicians and alienists rather than as psychologists.

In this general field we find three principal modes of work, in which psychological methods and materials are being employed. The first of these has to do with hypnotism, which is frequently employed for diagnostic purposes, that is, for ascertaining precisely what original mental experiences may have been responsible for the abnormal conditions met with at the present time. The modern theory of many of these mental difficulties

involves a search for the cause of the disorder in the history of the mind itself, exactly as the physical diagnosis searches for the cause of physical disease in preceding bodily conditions. Strangely enough it is found in practice to be true that one may often discover what these circumstances have been by throwing the patient into a light hypnotic sleep and then questioning him, when without such assistance it might well have proved quite impossible to secure the facts, either because they had been forgotten, or because the sufferer was unwilling to disclose them. On the other hand, hypnotism has been widely employed as itself a curative and preventive agent. The present tendency seems on the whole to be rather away from this use of it, and on various grounds which time fails us to detail. Suffice it to say that it has been extensively used in this way, and often with a large measure of success, when dealing with minor disabilities of a nervous or mental character.

Another great psychological agent which has been put in the hands of medical practi-

tioners by modern psychological study, is one which has been more or less unintelligently used as far back as we have historical evidence. This is suggestion. It may be employed in a number of ways, which so far as regards therapeutic considerations, may be roughly divided, following Sidis, into direct and indirect suggestion. Direct suggestion is illustrated by the command "Do this!" Indirect suggestion is illustrated by the statement, "Other people do this, and achieve certain desirable results." The one thing enters the mind as a positive mandate, to which the normal reaction is very apt to be negative, although in hypnosis it is extremely effective. The other enters consciousness in a persuasive way calculated to stir up ideas which will reinforce it and give the reaction the color of individual thought, rather than that of mere obedience to instruction. When skilfully employed, it has proved itself to be of amazing value in overcoming morbid states of mind and body, and in restoring disturbed mental equilibrium to conditions of normal vigor and balance.

The third chief method recognized in current practice, differs from the preceding, not so much in the intrinsic character of the processes involved, as in the elaborateness and completeness of its programme, as applied to actual nervous and mental disabilities. It is known as the method of psychic and motor re-education. It involves, in the first instance, the securing of the completest possible evidence about the conditions responsible for the patient's present state; and it involves furnishing him with the most exhaustive and intelligible knowledge of his own case; upon this foundation it undertakes to start him anew in the normal execution of the ordinary duties of life. In skilful hands it has proved extremely successful in dealing with a wide variety of nervous and mental troubles.

In the field of jurisprudence, a serious effort has been made to place psychology at the service of judge and jury in gaining satisfactory evidence. The efforts in this direction have been aimed, for the most part, toward two ends. In the first place, attempts

have been made to secure by statistical studies some reliable indication of the extent to which individuals may be capable, under the most advantageous conditions, of reporting truthfully occurrences which they have witnessed. If these investigations have had no other result, they have certainly served to show how extremely unreliable is the ordinary man's testimony upon such matters of detail as are often made crucial in criminal trials. Testimony as to height, to shape, to features, to color and style of clothing, to hour or place — all these items are apt to figure in essential ways in the identification of the criminal under indictment. The German psychologist Stern, has carried on a most interesting and valuable series of experiments in connection with this question.

In the second place, an effort has been made to ascertain, through the so-called association reaction method, the veracity of the witness or the indicted person. This method rests on facts discovered by psychologists in their studies of association, and has already been mentioned in an earlier lecture. It will be

remembered that lists of words are presented, one at a time, and the reagent is asked to respond with the first word or idea which comes into his mind after perceiving the particular word offered him. A certain normal time is required to make such reaction. This, of course, varies slightly from word to word, and from individual to individual. If, however, some word be shown which stimulates an emotional excitement in the reagent, his reaction is likely to be very considerably lengthened in time, or characterized by some marked peculiarity in the word with which he reacts. The assumption has been, therefore, that a guilty person, if asked to react to words which are directly connected with the crime with which he is charged, will sooner or later show marked variations in his reactions, such as would not be characteristic of an innocent person.

Most ill-advised and unguarded claims have been made for methods of this sort, as applied to the procedure of the courts. It is by no means impossible that in the course of time, with sufficient preliminary study, a measure-

able amount of useful technique may thus be put into the hands of the court officials. But at the present moment these methods have little more than a suggestive and corrective value, to be set over against a bigoted over-confidence of the legal mind in the methods now employed.

One phase of applied psychology which touches upon the work of the courts, and in particular on its educational side, is of undoubted significance and of rapidly growing importance. This is the psychological work being done in the Juvenile Courts. It is sometimes called clinical work, and this name is not altogether inappropriate. The work itself consists in the attempt to ascertain the exact mental status of the wards of the court, both as regards educational achievements, and as regards native psychical endowment. This is done in conjunction with a determination of their physical condition. Certainly it is of the utmost consequence, in attempting to determine what disposition shall be made of the children brought before the court for delinquencies of various kinds,

to know just what their mental equipment is. Only so is it possible to decide, with the slightest approach to intelligence, upon a practical course of treatment.

One of the most interesting of the fields of applied psychology is that of business and industry. Affairs are here in a very primitive condition. Nevertheless, they are sufficiently suggestive to justify a few words of comment. It has sometimes been stated that psychology would shortly be able — was indeed now able — to test a particular individual in such a way as successfully to determine whether or not he ought to enter upon a given industry; whether, for example, his muscular and mental equipment was such as to enable him to go to the front in the textile industry, in carpentry, in machine work, in masonry, etc. There is this measure of truth in the assertion: Each of these trades or occupations calls for relatively distinct types of motor and mental equipment. It will certainly be possible in the course of time to evolve methods which will vastly lessen the present wastage in the distribution

of human energies in fields to which they are unsuited. At the present time, however, we are quite remote from any considerable group of tests which can be applied with so much of confidence as to justify denying entrance to a trade. At all events, the methods available at present enjoy little or no superiority over those which are within the reach of any competent foreman in a shop.

The most striking field in the business world into which psychological investigation has been introduced, is probably that of advertising, and here there is a very considerable amount of interesting and valuable achievement.

Certain fundamental principles are obviously employed in all successful advertising. In the first place, the advertisement must be so arranged and so placed as to catch and hold attention. In the second place it must be seen so often, and must be made so striking, that it will remain firmly in the memory. In the third place, it must tend to create a favorable and agreeable attitude of mind. In the fourth place it must, if possible, tend

to precipitate action at once, and furnish adequate information as to how to go about getting the article which is advertised.

Needless to say, in these days of high specialization in the business world, an immense amount of suggestive information has been brought together by the compilation of statistics showing to what extent certain advertisements have succeeded and under what conditions. The manner in which these facts have been gained does not here concern us. Suffice it to say that they bulk very large in quantity, and are in some particulars quite definite in their implications. Such evidence, however, is often lacking in adequate indication of why success came to this advertisement and not to that. It is likely to show simply what succeeded and what failed, without revealing the reason. Psychological methods have been employed with no little success to discover the principles upon which the observed results have been obtained — in other words, to analyze the manner in which the ordinary mind reacts to an advertisement.

These points may be illustrated by selecting a few instances in which experimental analysis has been successfully adopted. The element of size affords perhaps the simplest illustration. It requires no demonstration to prove that of twenty objects simultaneously in the field of view, other things equal, the largest one is most apt to catch the eye. In the case of magazine advertising, this is especially true if an entire page be occupied by an advertisement. The principle operates with a maximum of certainty, because there is no competition to draw the eye away to other reading matter. For this reason full-page advertisements are well known to have an entirely disproportionate efficacy as compared with smaller advertisements. The same principle holds, although with modifications, in comparing the value of the half-page advertisement with the quarter-page, or with the smaller fractions.

There seems some reason to believe that the principle also operates in the matter of street advertising, and that the larger the sign, the more chance there is of gaining at-

tention. In this case, however, much more than in the case of magazine and newspaper advertising, another principle comes in to thwart, or at least to lessen, the value of the results attaching to size. This principle is one of an æsthetic kind, to which reference will be made in a few moments.

Attention is not only caught by the size, but also by the intensity of the stimulation offered. A brilliant light is more likely to catch the eye than one which is dim, and a piercing sound draws attention which would not be given to a more gentle one. In the case of advertising in papers or magazines, this principle is likely to be represented by the use of strongly contrasting colors. It may also be represented in the use of striking and unusual designs in which large masses of white contrast with masses of black. Experiments show quite clearly that if only one or two advertisements among a large group are colored, the colored ones have a far better chance of being remembered than do the others. Intensity, however, is a comparative affair, and if all the advertisements

were colored, the value of this device would disappear. In other words, intensity often comes to mean a form of variation, and that which is unusual is particularly likely to attract notice.

Another principle which involves attention, but much more obviously memory, the validity of which has been repeatedly proved by experiment, is that we tend to remember the first and last of a series of connected experiences better than any of the intermediate ones. In the case of magazine advertising this means that the value of the front and back pages is vastly in excess of any of the other pages of the advertising section. This is not alone because of the principle referred to, however, for it is clear that the advertisement on these surfaces is more often exposed to incidental notice, as the magazine lies upon the table or shelf. It therefore is brought into the mind oftener than advertisements in other positions.

A much more important principle of memory to which successful advertisers constantly appeal is the principle of repetition. There

can be no question — for innumerable experiments have proved this to be a fact — that the one and only certain method of impressing memory is repetition. Practically anything can be learned, if it be presented to the mind with sufficient frequency. Thus it is that in repeating an advertisement day after day and week after week, it acquires a cumulative value, not only because it keeps constantly in the public mind the matter to which it refers, but also because the statements which it presents become, by sheer force of repetition, fixed in the memory.

Memory, as is well understood, rests upon the principle of association. Successful advertising involves a skilful use of this fact. Much bad advertising has failed because of its disregard of this principle. To achieve the greatest success the article advertised ought to be associated with interesting and valued experiences. Advertisement directed to the sale of household articles may, in this way, be associated with the pride in the home and with the interest in family life. This principle incidentally runs out into the prin-

ciple of æsthetic charm — of the appeal, in general, to the feelings — a consideration which has been often exploited in modern advertising, to the production of very ridiculous results. Almost any excuse is now adopted in connection with an advertisement, to present the picture of some beautiful young girl becomingly attired, but often it is introduced with utter irrelevance to the object offered. There would seem to be relatively small reason for combining such a portrait with advertisements of razors, barbed-wire fences, and machinery for ditch-digging; yet all these absurdities can be found in current advertising. What in such instances is merely ridiculous, may in other cases involve what is definitely distasteful. Such blunders may be cited from the advertisements of food stuffs, in which altogether unnecessary detail regarding the preparation of materials is introduced in ways which are scarcely conducive to appetite. Other instances concerning medicines and clinical appliances will readily suggest themselves to any careful reader of modern magazines.

The experimental evidence is quite conclusive in showing that people are often influenced in ordering or buying by what are essentially sub-conscious memory processes. They do not recall having borne in mind a particular brand of the article they desire to buy, and yet upon being offered the same, or upon being asked what brand they desire, they are very likely to select one which has, in point of fact, been repeatedly called to their notice. The appeal to easy memorizing in this manner is represented by the rhymes and jingles and mnemonic verses which various enterprising firms have employed from time to time. Plymouth Rock Pants, and the DeLong Hook and Eye are instances of a long list of similar advertisers.

Two types of advertisement will be readily recognized so far as concerns the effort to secure prompt and immediate reaction. One type bears across its face in large letters the legend "Do it Now!" This is a poor device for catching the trade of the obstinate and headstrong. The other is more apt to carry an interrogative or suggestive phrase, such as,

"Can you afford to wait?" "Next week the price will advance"; or some other equally persuasive and less imperative form of command. Pride, vanity, the love of a bargain — these and all other human frailties are thus preyed upon by the skilful advertiser. But after all is said and done, when cleverly managed, there is, perhaps, no aspect of the advertisement more important than that which may be called broadly its æsthetic character — the extent to which it arouses agreeable sentiments, and thus stimulates a desire for possession.

This brief account of some of the features of the advertising situation may at least serve to indicate the points at which psychological method has been employed to secure more penetrating analyses of the specifications which a good advertisement ought to possess.

It remains only to repeat what was said earlier in the lecture, that applied psychology is for the most part not engaged in dictating to particular professions, trades, and arts, but rather in putting at the disposal of such

interests, adequate methods for ascertaining certain of the facts which it is important for them to know. The peculiarities of the individual which were disclosed in the early part of the chapter evidently stand in the most intimate relation to such an undertaking; for after all it is to individuals, as such, that appeal has to be made in many of the important situations of life. Those forms of appeal which belong to the group, or to the mass, will be discussed in another place.

LECTURE VI

SOCIAL AND RACIAL PSYCHOLOGY

LECTURE VI

SOCIAL AND RACIAL PSYCHOLOGY

I. Social Psychology

THE field of social psychology is partly under the jurisdiction of the sociologists, and might, perhaps with equal propriety, be known as psychological sociology. Whatever virtue may reside in the name, the facts and problems which are the property of this branch of inquiry are not very difficult to characterize. The title which is appended thereto can be arranged to suit the tastes of the reader.

Those aspects of the study of the mind with which we have been engaged up to this point, have more or less definitely assumed that mind is primarily individualistic; and so, in a sense, it is. Certainly the toothache from which your neighbor suffers is to your entire satisfaction and conviction not your own;

and, on the other hand, many of your views of life and property, and right and wrong, are to his sincere gratification not his own. Nevertheless, despite this individualistic side of the phenomena of consciousness, there is a very deep and true sense in which the mind is to be regarded as distinctly social, and not merely a private personal affair. Certain it is that every human being is born into social surroundings, that his earliest experiences are of a social kind, and that the very warp and woof of his mental structure are social in texture. Even the illustrations which we employed a moment ago, with their seeming indication that each human mind is shut within the prison walls of its own experiences, are seen to indicate in reality a different state of affairs. The toothache which your neighbor is enduring, if it be sufficiently severe, and be brought to your notice with sufficient insistence, is fairly certain to evoke from you expressions and feelings of sympathy, which are, in their inner nature, of a social sort. And the view which your neighbor entertains of your economic and political

convictions obliges him, in the very formulation of his own preferences, to identify himself with certain kinds of social ideals, and to set himself in positive opposition to certain others.

The myth which so persistently attracted the critical speculation of earlier generations, namely the myth of the man growing up in absolute isolation from other human beings, is now recognized for what it is — a fiction of the philosophic imagination. No human being does thus grow up, and were he to do so, his mind would not be a normal human mind, but one beset with pathological disorders of innumerable sorts, which would appear the moment he was exposed to social conditions.

The slightest consideration of the actual composition of the human mind reveals it to be replete with instincts and impulses, which are not only social in their effects, but which would be absolutely devoid of meaning were this social character withdrawn from them. Shyness, embarrassment, fear, anger, love, sympathy, sorrow, gratitude — these and doz-

ens of other similarly instinctive traits cannot be understood save in so far as it is recognized that they have their origin in social relations. This general conception of mental organization is too familiar to require elaborate defence or extended exposition; but in the light of the discussions of the preceding lectures it needs very definitely to be emphasized and borne in mind. It will not be forgotten that, in addition to these more strictly social instincts, human nature is provided with others, designed to cope more directly with the exigencies of physical nature.

Not only is the mind thus innately endowed with social tendencies and principles of reaction, it is also born into surroundings in which social influences have created a great variety of institutions, amid whose peculiarities its life is begun. Such institutions are the family, the church, the state, the neighborhood, and the industrial group. It may truly be said that the child never has any merely individualistic life, and that from the outset his experiences are such as

belong to his membership in one or other of these groups. They bring to bear upon him from the very first, influences designed to mould his character in ways congenial to their own spirit and temper; and at the earliest moment that he is able to enter intelligently and effectively into their interests and undertakings, he is called upon to become an active contributor to their enterprises.

The institutions already mentioned exercise an unflagging influence upon the socializing process in the child's mind; but they would be in a large measure helpless to produce the results which actually follow from them were it not for certain agencies through which their power is made effective. Of these agencies, language may easily be accounted first. It is a commonplace to say that it is the great medium of communication, the means by which we transmit our own ideas to the minds of others, and in turn are enabled to appropriate their thoughts. More than this, it is the means by which we enter most intimately into the inner lives of others.

Growing as it has out of primitive forms of gesture, designed partly perhaps to give vent to emotional excitement, partly to depict meaning and intention by graphic methods, it has come, in the complex form of vocal gesture, which man has made so definitely his point of superiority over the animals, to be not only the most essential medium for binding together human interests of all kinds, but also one of the most indispensable engines for the conduct of individual thought. Many psychologists have held that reflective thought cannot, or at least does not, occur without the use of language. This is probably too extreme a position. Nevertheless, it is certainly true that most thinking involves at one point or another the use of mental words. Language is thus the usual material of thought, though it be not the exclusive one.

It is moreover, in its written form, probably the most commanding agency for preserving traditions, customs, and beliefs from generation to generation. Similarly, in its spoken forms, it has in earlier ages been the means whereby the ceremonies of religion, the stand-

ards of morals, and the embodiments of myth have been retained from epoch to epoch.

Another agency which, in the early life of the child, occupies a position of almost equal importance, is that of play. Various theories have been offered to account for the phenomena of play. It has been set down as a mere display of the excess energy generated in the youthful organism. It has been identified with the spontaneous expressions of the unspoiled and inexperienced mind. It has been regarded as possessing a peculiarly indispensable function in affording direct preparation and training for the more serious affairs of later life. The half-playful fighting of young animals is often instanced as a case of this disciplinary character. Whatever view be taken of the origin of play, its significance as a means of introducing the child into very vital forms of social contact is quite beyond question.

Writers on this subject are wont to recognize three stages of play. The earliest of these has to do with the mere gaining of motor control by the child over his muscles.

Plays of this variety are well illustrated by the activities of the young infant learning to use its hands and legs. At this stage of development, the distinction between the serious occupations later called work and the more sportive ones known as games and plays, has of course not arisen. The gaining of muscular control in the manner suggested is often for the little child a matter of sober and serious interest. It deserves the name of play chiefly because it is of the nature of a spontaneous activity, and generally has the pleasurable character of all successful achievement.

Later on, as the child grows older, there appear various forms of competitive plays, in which emphasis falls upon the outstripping of other contestants. Here we find games involving running and jumping, wrestling and throwing, and the various other expressions of physical capacity. Plays of this type are unmistakably social, despite the emphasis which they seem to place upon the negative aspect of sociality — namely upon the conquering or surpassing of other human beings.

The third type of play is generally in full possession of the field during the adolescent period. At least, this is true in the case of boys, though owing to various exigencies somewhat less obviously present in the case of girls, who are more apt to pass immediately into semi-serious social relations. The reason for this variation need not detain us here. The several forms of *co-operative* sports, such as football and baseball, and the many games in which *teams* are involved, all serve to illustrate the point at issue. In games of this character stress does not fall upon the successful outstripping by the individual, as an individual, of some one other person, so much as it does upon the victory of the team to which the individual belongs. Clearly games of this character serve to illustrate not only the negative form of social consciousness, indicated in all games of competitive character, but much more definitely the positive, comparatively self-sacrificing type of social sentiment, which in the last analysis deserves to be recognized as most explicitly social.

It is not to be understood that these several forms of play necessarily exclude one another in the order of their occurrence. In describing them in this somewhat chronological form, it is merely intended to indicate that they make their first appearance at somewhat different times; after having arrived, they may persist indefinitely in one form or another. It is, however, clear, that only the two latter forms possess any overt social character. Certainly they are the only ones which would necessarily lead to a conscious recognition by the individual of social relations as such.

Although in certain respects apparently less true of our own time and people, it seems to be fairly clear that among primitive peoples the fine arts exercised a very important and definite influence of a social kind. This was so intimately bound up with ceremonial practices of various sorts as to make the separation of the one thing from the other somewhat hazardous. Thus among primitive peoples the dance and the accompanying music, which appear to have been

the earliest expressions of art, were connected with the celebration of feasts and the execution of certain ceremonials involving definite forms of social co-operation. These festivals undoubtedly served to stamp upon the mind of the participating individual a very vivid sense of his share in the fate of the group. Especially must this be the case in the war dances where the pantomime displays the drama of the battle and the use of arms. Here the youth beholds the fighting men drawn up as for the stern business of actual war. He learns how weapons should be brandished, what postures he should take, how he should deport himself in order that fear may strike home to the heart of the enemy. Even in the dances which celebrate the successful harvest, or precede the hunt, in those which are designed for purposes of sexual excitement, or for purposes of propitiating outraged gods — in one and all his membership in the tribe is brought home to him with pungent emphasis.

In our own time the fine arts, save literature, have, to some extent at least, lost this

intimate contact with the vital interests and affairs of the community, and thus play a less important part in the positive influences of a socializing kind than was formerly the case. Religion, which was originally bound up most intimately with these earlier expressions of art, still retains in many communities a large share of its primitive hold upon the consciousness of the individual, and to this extent continues to be a positive factor in preserving and developing social consciousness.

In connection with the ceremonial practices of primitive peoples, to which reference has just been made, it will be remembered that with many tribes there is for the adolescent youth a definite ritual of initiation into the full rights of the tribe. Practices of this character must tend to leave a most lasting and vital impression of the significance of the life of the group upon the youth thus introduced into its privileges and obligations. The secret societies of modern times and civilized peoples, and particularly the college varieties of these societies, have unwittingly

hit upon the prodigious power of this experience to stimulate the imagination and to call forth a loyalty to the group to which thenceforth the youth belongs, that is out of all proportion to the logical value of the ceremony and the practical significance of the organization. Here again, as is so often the case, we find men stumbling blindly into paths which come they know not whence, and lead they know not whither.

Another extremely important means by which entrance into the group is brought about and rendered effective, is that of social imitation. The significance of this element in the social situation is possibly most noticeable in the early periods of childhood, although there is no age exempt from its consequences, and in many of the relations of so-called society it is most conspicuously in evidence. In all these cases there is a demand for a pattern, a standard. The attempt to meet this successfully excites the imagination and stirs the impulses. Among gangs of boys, leadership carries with it both the privilege and the obligation to set

this pattern. No ambition so moves the small boy as that of successful emulation of this leader. Not only does this ambition extend to the copying of his acts and modes of speech, but even to securing attire similar to that of the idol of the hour. This same kind of thing is equally in evidence with girls, and a large part of the endeavor of conventional society people is on the one hand directed to the out-doing of the people ranked as being on the same level, and on the other hand to the emulation and imitation of "sets" and persons recognized as enjoying a higher rank. In this particular instance there is not only emulation among the individuals of the group to equal or surpass the achievements of the leaders, there is even a sort of unconscious attempt on the part of the group itself to carry the social heights already scaled by other groups. This kind of thing is perhaps more readily identified where social life is organized around a recognized aristocratic core with royalty or its substitute at the centre, than it is in societies more democratically organized; but the essen-

tial phenomenon is to be recognized by the shrewd observer in societies of every kind and stripe, from the Hottentot and the Bushman up to the Four Hundred and the Court.

It would be a grotesque travesty on the facts to imply that mere imitation affords a complete and truthful account of the situation called to mind by the lines just above. This has indeed been intimated in the form of the statement. Certainly the fact is that the disposition to imitate is most intimately interwoven with another trait, i.e., the tendency to the untrammelled expression of the individual and to those lines of action which definitely depart from recognized social usage. This form of psychological independence may extend itself primarily to matters of mere social behavior and a flouting of the conventions of taste and etiquette, or it may concern itself with scientific, intellectual, and practical exploits away from the main beaten paths of the familiar.

In its scientific and utilitarian aspects, this tendency to individual variation often

takes the form called invention, and as such is recognized both by the scientist and by the common herd as a quality of prime consequence in the furtherance of social welfare. Similarly, the expression of such individuality as takes form in literature or in art is accorded an encouraging recognition. In political life, also, the deviser of a new scheme for the betterment of governmental procedure is acknowledged as a contributor of unquestioned value to the life of his time. In matters of purely conventional behavior, the social protestant — the reformer, the come-outer — may be equally independent in his contribution, but he is somewhat less likely to be heralded as a person who has contributed an important addition to the progress of affairs. However, the main point is not to suggest the relative values of the various ways in which individuals tend to diverge, rather than slavishly follow accepted precedent and practice — it is primarily to emphasize the fact that along with persistent and fundamental tendencies to imitate, there are these individualizing impulses, which are

quite as native, and to which no small part of human progress is probably to be attributed.

The relatively trivial variation from established custom and belief, represented by the conduct of the ordinary person, takes on a more vital and significant character in the case of the genius; it is represented in slightly less degree in the case of the individual of marked talent. It is not always easy to be certain until years or even generations have passed, whether the variations introduced by a given individual are to be accounted of permanent worth; and inasmuch as the difference between the crank and the genius is often largely one of the practical value of his variation from the traditional, it is clear that one cannot always be certain during their lifetime how such persons should be designated. But be this as it may, it is a commonplace of the most obvious kind to recognize that the genius, whether he be a Newton or a Laplace, a Wagner or a Rembrandt, an Emerson or a Buddha, is always a man, whose social and racial value is in

the first instance dependent upon the radical departure from previous achievements and beliefs, which he embodies and illustrates. Whether or not we accept the "great man" theory of human progress, it were idle to call into question the crucial and indispensable contributions to such progress represented by these inspired despisers of the conventional.

We may well glance, for a moment, at certain peculiarities of thought and behavior which belong to groups of human beings when gathered together. In a certain sense, which has already been clearly indicated, no one is ever literally and entirely free from the influence of other persons. Nevertheless, there are abundant facts to prove that when persons are gathered together in close actual proximity, certain mental peculiarities are manifest, which do not appear so clearly under other conditions. Not a little has been written in popular journals concerning the so-called psychology of the mob, and of the crowd. Consequently the topic enjoys a dubious repute. Making a liberal allowance,

however, for crudity of knowledge and for exaggeration of facts, there still remains a mass of interesting data, whose significance we are, perhaps, but imperfectly able to interpret, but whose reality is not open to challenge.

One of the most striking of these facts is the oft-observed tendency of a crowd or a mob to take on characteristics quite at variance with those of the individuals composing the overwhelming majority of its constituents. This result is generally brought about through the influence of the leader of the crowd, who may owe his temporary position to any one of dozens of essentially incidental causes. It is an equally familiar fact that the conditions under which crowds gather are generally unfavorable to critical and reflective thought. This is certainly true without qualification in the case of the mob. Moreover, the level of intelligence which it is possible to reach by appeal under such conditions is ordinarily that of the most mediocre intelligence of the individuals composing the crowd. This fact is well recognized by all successful

public speakers, belonging to the order of so-called "spell binders." They never make the mistake of appealing to the appreciation of the abstruse or the recondite; they never descend to forms of argument which could not be successfully followed by a child recently dispossessed of its milk teeth; and in place of syllogism and reason they generally offer dogmatic and alluring precept, skilfully calculated to play upon the known prejudices and personal interests of the mass of their hearers. In the presence of a miscellaneous audience, only the most audacious of public speakers dares enter upon a line of presentation, which requires for its successful apprehension thought processes of any but the most rudimentary kind.

The feebleness of intellect evinced by the crowd is perhaps nowhere more strikingly in evidence than in the forms of analogy which it is ready to swallow as offering convincing argument. This is undoubtedly the most familiar device of the partisan advocate, who must make his case at all costs. Again and again he likens the issues which he desires

to defend to other issues, whose merits are entirely beyond doubt. If he can thus identify his cause in the minds of his hearers with another cause already enjoying their cherished confidence, his victory is easily won. It will afford any listener to political speaking, to mention no other variety, an interesting side-light on the way public opinion is moulded, to observe how persistently and how successfully this device is employed. The support of the speaker's party, or his favorite policy, is thus identified with patriotism. To oppose him is made to appear as a peculiarly despicable form of treachery to national welfare.

Again, it is a matter of familiar knowledge in the case of mobs, and all crowds which have been moved to high excitement, that the sense of individual responsibility is astonishingly diminished. Probably not one per cent. of the members of mobs which have indulged in violence could by any possibility have been moved to countenance, much less to participate in, the deeds of the mob, had they been appealed to singly and as individ-

uals. This fact has at least two psychological explanations. In the first place, the mere mass of human beings by whom one is surrounded in a crowd exercises upon the mind a soporific sense of divided responsibility — a feeling that what others thus indorse, one may oneself more safely encourage, and that to set one's own convictions in array against the convictions of so many others, can only be justified on grounds of personal vanity and self-assurance. In the second place, there is very good reason to believe that after a crowd has been harangued for a time by skilful speakers, all pressing the same idea, there supervenes upon the minds of the auditors a condition at least similar to hypnosis, in which opposing and inhibiting ideas lose their power and are practically suppressed. As has already been explained in another lecture, circumstances of this kind in the case of hypnosis proper lead to prompt and direct execution of the ideas suggested. In the ordinary case, however, suggestions which involve in their execution acts that the patient believes to be morally wrong or

æsthetically revolting are all but impossible of execution. Evidently, in the case of the mob, this difficulty is overcome. Moreover, the likening of the mob mind to the mind of the hypnotized person is only an analogy, whose imperfections extend to yet other points than those mentioned. Nevertheless, the analogy has a distinct measure of significance, because the mob consciousness is *per se* one governed by some group of ideas, temporarily so highly exciting as to swamp in their violence all competing thought.

It must not be supposed that these phenomena of mob action are in any way limited to the expressions of violence and moral depravity. The question of motives is not at stake. These may be good or they may be bad, judged by their subsequent social consequences. Probably they always carry with them in the minds of the participants one or another kind of fundamental justification. For example, during the period of the Commune, one finds repeated instances of the most brutal forms of mob activity, and yet the mouths of the leaders were incessantly

filled with high-sounding moral doctrines and with elevating precepts of government. Again, the crusades unquestionably represent much of the spirit of the unthinking crowd, and yet, from one point of view, nothing could be religiously more romantic or more disinterested than the motives which led to this great movement.

This disposition to be moved by ideas of a morally unimpeachable character, as well as by those which appeal to violence of one form or another, is well represented in the response which a crowd will make to such a symbol as the national flag, or to an appeal for loyalty, or a plea for the freedom of the oppressed.

Sects, castes, and classes of societies often exercise upon their members influences closely similar to those which have been just described, despite the fact that they are not necessarily gathered together in the physical presence of one another. As a matter of fact, such groups do more or less come together, under conditions which emphasize their social solidarity. But the effects which

we have in mind outlast such forms of intercourse. So far as they actually entertain convictions and practices in common, just so far they tend to reinforce in their members the ideals which they embody. They tend to discourage reflective criticism, and to divide and dissipate the sense of real personal responsibility for these convictions and practices, and to stimulate to prompt and effective observance the habits and rituals which they cherish.

The same kind of thing is revealed on a much larger scale and in relation to much more familiar interests by the vagaries of fashion. Here we meet in perhaps its most glaring and unmistakable form the imitative tendencies to which reference was made a little since. The professional group, the social set, or possibly the pace-maker in the set — these and a dozen other influences of a similar character, in which finance plays an exasperating and often a depressing part, contribute to determine what we shall wear and how we shall wear it. If clothing were solely to cover our nakedness, the influences

which determine our modes of attire would be relatively simple, and the results relatively rational. As it is, the encasing of our physical selves involves appeals to taste, to pride, to vanity, to ambition, and to caste, to mention no other motives, which complicate the situation in endless ways. Nor must it be forgotten that in this case, at least, the contaminating hand of trade levies a heavy toll upon the unsuspecting victim; in magazines and street cars, in newspapers and on signboards, in special articles in particular journals — in literally dozens of places the mind is exposed to stimulating suggestions designed to result in the purchase of this, that, or the other *article de luxe*, by means of which physical attractiveness may be enhanced and social position indisputably determined. It is difficult to speak of this matter without allowing oneself to lapse into the extremes and exaggerations which the subject so readily invites. Certainly, "conspicuous waste" is increasingly with us. Nevertheless, there is at least a touch of truth in the phrase of the woman who said that to be well dressed

afforded her a comfort that religion could not give.

Turning to more serious instances in which the psychology of the crowd reveals itself in contemporary life, one can hardly hit upon a more crucial example than that of the religious revival, in the form in which it is frequently encountered. Let it be understood clearly that we speak here neither with criticism nor approval of the methods in vogue, nor of the results achieved. Revivalism is not here on trial. We are viewing the situation in a purely objective way with a view to ascertaining the manner in which the religious assemblage influences its membership. In the more skilfully conducted of the revivalist meetings we find stirring music, a carefully developed atmosphere of expectation, which has often been worked up to by deliberate preliminary measures, frequently including the exploiting of the spiritual powers of the leader of the revivals. We find great excitement, and, as the service proceeds, a very definitely hypnotic effect is produced upon the audience by the skilful

suggestions of the revivalist. No doubt the same agencies are more or less regularly operative in all those forms of worship where ritual is employed. Of the success of the method in securing a highly concentrated attention, in stimulating to repentance and remorse, and to resolute and vigorous entrance upon new modes of life, and new standards of conduct and belief — all this is too familiar a matter of everyday knowledge to require defence or permit challenge. Certainly, the writer knows of no more interesting place to study the phenomena of the crowd, than is afforded in an assemblage of this kind.

This topic leads naturally to a brief reference to the larger aspects of religious experience and to its wider historical setting.[1] The history of religion, encompassing not only the history of our own forms of Christianity,

[1] It is a source of regret to the author that the psychology of religious experience could not be given more extended treatment. The subject has a most interesting literature which deserves the careful attention of thoughtful people.

but taking account of all the great world religions and the more rudimentary and fragmentary beliefs of primitive peoples still living upon the earth, discloses several fundamental facts.

In the first place, it is reasonably clear that religious practices and religious beliefs originally emanated from the effort of man successfully to cope with the forces of nature. In so far as he was not able by the exercise of sheer intelligence and his own muscular power and dexterity to achieve the results necessary to his maintenance, he turned to other devices which, for some reason or other, suggested themselves as efficacious in the meeting of his needs. It appears, therefore, that in a large sense, religion has its sources in practical interests.

On the more strictly psychological side there appear to be two main groups of feelings, which are chiefly responsible for religious beliefs. One of these has to do with the essential feelings of dependence and of human helplessness in the face of the majestic forces of nature and the dispensations of

fate. The other has to do with the sense of mystery and wonder in the presence of the great manifestations of natural power — the lightning, the thunder, the rainbow, the rising moon, the setting sun, the stars overhead, the tides, the ceaseless energy of the sea — these and innumerable other forms of nature's expressions have impressed the imagination of man from the earliest time. Birth and death, hunger and thirst, the life of dreams and other human experiences of this type, have all co-operated to produce upon the human mind a sense of the vastness and the range of the universe in which we live, and have naturally elicited from thoughtful men a very powerful conviction of the mystery of it all. Obviously this sense of mystery may readily be conceived as merely a form of the feeling of dependence. This, in fact, is true, and yet the two feelings are distinguishable, the one from the other, and deserve separate mention.

Around these feelings, and under the influences suggested a few lines above, have grown up the elaborate practices and the

complex systems of belief which are embodied in the great historic religions. Commonly these beliefs have connected themselves with the name of some great religious leader, in whose life and person they have been believed to be incarnate.

So far, however, as concerns the experience of the average individual, the main issue is not that of the historic origin of his nominal belief as a possession of his age and sect — it is rather the powerful personal experience in which he himself enters fully into this religious consciousness of his own time and people. The evidence points with unmistakable consistency to the conviction that adolescence is the period in which the religious consciousness first comes to its own. This fact secures both recognition and confirmation in the practices of many primitive peoples — among whom religion is intrinsic to the most intimate activities of the tribe — through the ceremonies of initiation already mentioned by means of which the youth enters into full participation in the privileges and obligations of tribal life.

Adolescence is recognized by psychologists as a period of great emotional instability. It is a time of radical physical growth and alteration, and the changes which are so obvious to the external eye are reflected in deep-seated transformations of the mind and character, which are no less real and immutable for being invisible. The fundamental character of the changes of this period is recognized fully enough in the matter of the sexual development; and this, no doubt, is the most critical phase of the whole situation. But that other changes concerning the vital processes of the inner organism are occurring with tempestuous rapidity, and by virtue of their extent and speed stamping ineffaceably upon the mind features which are to characterize it throughout the rest of life — this is not so generally understood. These alterations, particularly those of the sexual character, lead inevitably to a vital reconstruction of the social world in which the young boy or girl lives. It is, therefore, a period of intense and lasting change in social consciousness. The distinctly social emotions are under new

and powerful excitement. It is the period of moral maturing. Never again are the responses to social obligation, to sympathy, to pride and ambition more sensitive and more vigorous. It is, therefore, from every point of view essentially the period of full moral and religious bloom.

In view of these facts, it is perfectly natural that the great mass of religious conversions should occur during the adolescent age, and that this period should be the one in which the churches and other religious organizations succeed in recruiting by far the largest number of their communicants. On this point the statistics are overwhelming in their unanimity. Any other outcome would require explanation.

It is not for a moment to be supposed that such a statement implies the absence of conversions from the later years of life, to say nothing of the earlier ones, for they undoubtedly occur and are undoubtedly genuine. But the most poignant of religious phenomena, so far as concerns the life of feeling and emotion, are undoubtedly to be found during this period of adolescence.

II.— Race Psychology

An important distinction is drawn between social psychology and a set of inquiries commonly known as race psychology, or folk psychology. The latter division of inquiry was historically differentiated at an earlier period than the branch which we have been discussing thus far in this lecture. Beginning as an off-shoot of the psychology of Herbart, it speedily took on, and has since retained, most intimate relations with the science of anthropology, and with those phases of sociology which stand in most intimate relation to the latter. Its general problem is concerned with the analysis and description of those mental traits which connect themselves with racial stock and with national groups.

A moment's reflection suffices to make it clear that such influences as we have considered in the present chapter, combine to produce in each community types which are readily recognizable as distinct from those of neighboring communities. In each com-

munity, as such, are groups and sub-types, which have each their own peculiarities and idiosyncracies. In a large way, these differentiations lead to those distinctions of race with which, in a practical fashion, every one is familiar.

We distinguish thus, in our common thought and language, between the oriental and the occidental mind; between the savage and the civilized mind; between the Latin and the Anglo-Saxon mind; between the mind of ancient Egypt and the modern mind. No doubt it would be a difficult task for any save the student of national life to determine with certainty and ease just wherein consist the differences that underlie these popularly recognized distinctions; but that the distinctions are real, and that they are susceptible of identification, seems hardly open to debate.

We are accustomed to look upon these divergent traits as in some measure due to the exigencies of climate and geographical habitat. That such influences have affected physical type, not only as regards stature and color of skin, but also as regards many

other details of bodily structure, is ordinarily accepted as obvious fact. It is not our province to challenge the accuracy of this conception, which in a broad way is no doubt valid. It suffices for us to remark that whether or not as a consequence of this physical variation, there are undoubtedly present among races characteristic mental types which accompany these divergences of bodily make-up and physical environment. We may, however, protest at once against a popular misconception often connected with these facts, i.e., that the racial differences of mind rest upon essential innate differences of brain structure. There is no good evidence to support this view, and much which tends to disprove it.

A few illustrative instances may serve to make clear these points. A tribe living by hunting and fishing and having all its group activities determined by these modes of life, must obviously have its attention occupied with a very different series of circumstances from those of a tribe dependent upon pastoral forms of sustenance, and the objects of its intellectual interests will be still more widely

at variance with those characteristic of an agricultural people. Not only will the objects of daily thought be different, but an entirely different series of habits will become established and recognized as important, for the life of the group will attach itself to a different series of natural phenomena, and in course of time it may be expected that a very different pattern of mind will be evolved. Certain it is that the institutional and ceremonial forms which grow up in the one case will differ widely from those which appear and become fixed in the other. A different group of instincts is likely to predominate in determining social perspective. In the hunting type, physical bravery, quickness of eye, and shrewdness of observation are likely to be at a much greater premium than stolid industry and conscientious attention to routine detail. In the agricultural type, on the other hand, systematic endeavor, continued and faithful attention to detail, tenacity of purpose, and a high appreciation of long sustained effort, are most likely to implant themselves as the desired and valued type.

Again, the habit of mind of a hunting people, living as do the Eskimo among the rigors of Arctic nature, must present essential distinctions from the hunting type evolved under tropical and subtropical surroundings, as in the African tribes. A close study would thus unquestionably reveal distinctions corresponding to species inside the larger hunting genus which represents the type-form in its bolder contours. Moreover, the pastoral life of a people living upon great plains where cattle can rove freely for weeks on end, must distinguish itself in many particulars from the life of other pastoral groups living in high mountainous regions. This speculative assertion is, on the whole, well substantiated by a study of the ceremonial differences which are found characterizing peoples who live amid divergent surroundings of this sort.

We have in the literatures of the great historic peoples of the past abundant evidence of the variant types which have been evolved in different periods of the history of man. No doubt there is much overlapping of traits, which transcends merely chronological dis-

tinctions. Nevertheless, we recognize what we call the classic Greek point of view, and the classical Greek mind, as distinct from the Roman mind, from the mediæval mind, and from the mind of modern civilization. These differences undoubtedly attach themselves in part to purely conventional and extraneous matters. Anger among the Greeks was presumably much like anger among the Anglo-Saxons; and fear and hope have surely changed their character but little. On the other hand, however, if we may judge with any assurance, romantic love among the sexes is a relatively modern attribute, as it is certainly an occidental one. The entire machinery of modern civilized life, with its telephones and telegraphs, its engines and its mechanical devices of all sorts, has unquestionably changed the face of social, as well as physical, nature, in ways which are reflected in the very texture of the mind itself.

It is difficult to say exactly wherein the mind of the young German differs from that of the young Frenchman and both from that of the young American. Each studies the

same mathematics and assents thereto; each studies the same physics and chemistry, and subscribes to them; each accepts certain doctrines of political economy as essentially true; upon vast ranges of historical fact there may be little or no divergence of opinion; even upon a considerable number of religious tenets they may be in substantial agreement. And yet, somewhere in their attitude toward social usage, in their conception of government, in their conception of good taste, they may be indefinitely far apart. How far these divergences are matters of education, assimilated during the plastic period of childhood, and how far they are innate, it is again very difficult to determine. From one point of view, indeed, it is largely a matter of indifference whether these discrepancies are mentally indigenous or acquired. The practical result is certainly much the same, in that it produces individuals possessing the hall-mark of a common type, which for all ordinary human relations marks them off from other differently equipped types.

Perhaps the most striking psychological

fact about the case is that whereas the logical processes are substantially identical among all the members of the various groups, we meet differentiation and divergence the moment we touch upon matters of belief, of sentiment, and of feeling — all those influences which make most immediately for the establishment of habit and social tradition.

In conclusion, then, it appears that the human mind is not only social in the sense that it is born into social relations, and grows to maturity amid these, affected by them and in its turn affecting them, it is also true that it is a racial mind, or a group mind, taking on the essential characters of its own epoch and its own clan. To consider it out of perspective with these influences, is to fail fundamentally in the understanding both of its origin and of its significance. A man is the child of his time and race as truly as of his parents.

LECTURE VII

ANIMAL PSYCHOLOGY

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RESPONSIVE to the imperialistic tendencies of the time, psychology has reached out beyond the boundaries of the human mind to take within her province the study of animal intelligence. She may justify her invasion of this field on at least two grounds. In the first place, she conceives her problem as concerned with the study of consciousness, wherever found and under whatever forms. If it can be shown, therefore, that animals probably possess a type of consciousness, psychology will be under obligation to take cognizance of it. The common conviction of mankind strongly confirms the truth of this supposition. In the second place, and much more significant, is the feeling, now so universally entertained, that human beings have evolved from pre-human animal forms. Accordingly it may be reasonably inferred that a study of animal

types of mental behavior will assist us in securing a just conception of the early stages of the human mind, and so possibly teach us more intelligently to interpret the higher manifestations of that mind. Needless to say, we must and do bring to any such study of animal consciousness preconceptions formed from our knowledge of human mentality.

In so far as psychologists have entered upon this task, they have frankly encroached upon territory hitherto pre-empted by zoölogists and naturalists. But the field is broad enough for all, and if the psychologist is not able to prove that he has something to offer which the others have not, he will speedily be crowded to the wall; whereas, if he can in fact make contributions which are unique, he deserves, and will doubtless receive, encouragement.

It is by no means easy to prove that animals are conscious, and some very keen and learned men have believed that they are not. It is worth a few moments' reflection to consider the lines of evidence which may be adduced in support of one or other of the opposing views about this matter.

One who has occasion to drive through a herd of cattle or a flock of sheep encountered upon the highway, may well question whether such animals have any intelligence, and certainly the behavior of barnyard fowls, when thus disturbed in their peregrinations, justifies the slenderest estimate of their intellectual equipment. Nevertheless, no owner of pets and no one intimately acquainted either with wild or domesticated animals of the higher orders ever questions their possession of a certain measure of mentality, however much of diversity may be recognized in their several talents. Indeed, thanks to the "nature fakers," a wide sentiment has been aroused attributing almost superhuman intelligence to some wild animals.

This prepossession has been greatly emphasized at times by the achievements of celebrated trick animals, especially dogs and horses, of which "Clever Hans" is perhaps the best example.[1]

Popular opinion is less unanimous con-

[1] Cf. "Clever Hans," O. Pfungst. Trans. K. Rahn, New York, 1911.

cerning the mentality of the very low animals, such as the worm and the more sluggish insects. These are generally voted "very stupid," but even so, it is not commonly supposed that they are insensitive to pain. The micro-organisms like the amœba, being known, as a rule, only indirectly and on hearsay, there is prevalent no general view in their case.

On the whole, common sense may be said to recognize that intelligence of a high order belongs to certain individuals in the animal kingdom, that a lower order of intelligence is represented over wide ranges of animal life, certain genera and species regularly surpassing others. It does not recognize that any animal form is so wholly lacking in consciousness as not to feel pain when injured. In so far, then, it may be said to hold that consciousness is a universal property of animal life.

No doubt this conviction of common opinion is based in an unreflective and uncritical way upon the similarity of animal behavior to human behavior. Whatever behaves as a man behaves has an intelligence similar to

that of man. This is probably the argument implicit in the belief of the ordinary person, who has had no occasion to think about the matter.

When, however, one finds a great thinker like Descartes urging that animals are mere reflex machines devoid of feeling, and when among our contemporaries we find many who, like the eminent physiologist, Loeb, would challenge the possession of consciousness by the lower organisms, one is obliged to take stock of one's evidence.

We may recognize squarely that all the evidence which we can secure will rest for its value upon the reliability of analogy. No one knows that any other human being is conscious save in so far as the conduct of that person leads him to believe that a mind like his own is directing the conduct. The same thing is true in justifying the inference of consciousness in animals. The practical problem is to determine how closely the behavior of animals resembles that of man, and in what respects it differs.

Descartes took the view that animal action

can be explained as being purely reflex. The sight of food releases muscular mechanisms carrying the animal toward the food, just as tickling the nostrils produces sneezing. Both are reflex actions requiring no conscious control.

Probably no single criterion is adequate to determine the presence or grade of consciousness in an animal. A number of things must be taken into account. Nevertheless, the most important factor is the ability of the animal to learn, to improve his reaction to a given situation, to show that in some form or other of memory he carries over the import of one experience to another. The moth that flies again and again into the flame until destroyed must be denied the capacity to learn, so far at least as concerns that type of situation. But the bird that learns after a trial or two to neglect seeds of a certain form or color which are disagreeable to the taste, clearly can learn, clearly can take advantage of the lessons of experience, clearly has some kind of memory, and in so far may be supposed to have conscious-

ness. In other words, the most essential criterion of the presence of mind is the capacity of educability.

Taken alone, however, and without intelligent qualification, this criterion would be ineffective. We know that certain animals will modify their behavior as a result of experience, but do it so slowly as to make one hesitate to attribute intelligence to them. For instance, an animal which requires two cr three hundred trials to learn with assurance to turn at a given point in the pathway leading to its food, must have a vastly different organization from one which learns the second or third time it tries. Moreover, inorganic phenomena disclose slow changes of this sort, and we should never think of ascribing consciousness to them. The mellowing of tone in an old violin, the softening of color in a painting, the formation of the crystal in the earth, these and many other instances might be cited as examples of the slow but striking modifications which occur in non-living substance.

For reasons similar to those discussed in

Lecture II, it has therefore come about that a very important factor in determining this issue in the case of a given animal form is the structure of the nervous system. An animal whose nervous system is very similar to that of man, one which learns to improve its reactions with moderate rapidity, may presumably be regarded as having a form of consciousness. The significance of such a complex criterion as this, and its actual limitations in application, will appear later.

Until a relatively recent date the method of studying animal behavior has been chiefly observational and anecdotal. Occasional reports of hunters and travellers concerning wild animals are matched with observations made from time to time upon the habits and behavior of domesticated animals. This method has produced the great bulk of our present supposed knowledge of animal life. At its best it is excellent, and it reaches ranges of fact accessible at present to no other method. At its worst it is exposed to all the most serious sources of scientific inaccuracy in imperfect observation, inaccurate

report, and wholly unwarranted inferences. Not only the nature faker (intentional and unintentional) falls under this indictment, but also the great majority of narrators of remarkable incidents about pets.

Over against this method, as the most important contribution of contemporary scientists in this field, is the method of experiment. It will be remembered that we have previously defined an experiment as an observation made under conditions of control. The same definition holds here. An experiment upon animal behavior simply involves putting animals under conditions which the observer has created, and which he can alter at will. It enables him to ascertain exactly what animals do, when they adjust themselves to such changes. If he has had charge of the animals since their birth, he is also in a position to judge with certainty how far their behavior under the new surroundings may be due to influences to which they have been previously subjected — a consideration which the older methods never could take adequately into account, and one which often

changes utterly the interpretation to be put upon an animal's action. We shall have occasion a little later to make this matter clearer by illustration.

Certain difficulties will immediately suggest themselves as inevitable incidents of an experimental procedure. In the first place it is relatively, if not absolutely, inapplicable in the case of wild animals. The moment such animals are brought into captivity, their entire behavior is likely to be altered, and no inferences made under such circumstances could be defended as valid for the life of nature. Granted a large enough tract of land under the experimenter's control with appropriate climatic and geographic characteristics, the experimental study of many of the smaller wild animals is in no way impossible, albeit very difficult. Obviously the mere size of certain wild animals renders it highly difficult to secure proper conditions for their experimental control. Unless the surroundings can be made to simulate those of nature with extraordinary fidelity, there is always a high probability of stirring up

emotional reactions, timidity or fear for instance, which may wholly disorganize the animal's normal capacities.

These difficulties are very genuine and require endless ingenuity and patience in order to circumvent them. In many instances success is still far in the future. In many others, however, it has been achieved, and in the most impressive way. A peculiarly subtle form of difficulty is often encountered, which can be best indicated by reference to the actual methods employed with animals and to the aims of animal experimentation.

A large part of the problem of experimental animal psychology concerns itself with determining what actions animals can learn, and how the learning is done. We have already remarked that an animal which proves quite incapable of learning anything at all may well be suspected of having no mind. The practical question which confronts the experimenter is the arrangement of a problem whose solution shall be fairly within the capacities of the animal. We should not judge a child lacking in intelligence because it could not

at four years of age master the binomial theorem. We must be equally careful not to overtax the intelligence of the animal and so fall into a false conclusion.

Moreover, we must not only secure a fit problem, we must also devise conditions such that the animal will feel some incentive to undertake its solution. This has been one of the most serious obstacles to overcome in working with the more shy and sensitive animals. Broadly speaking, three general types of incentives are appealed to. (They might easily be reduced to two.)

The first is hunger. The animal is kept without food long enough to be made energetically hungry. He is then put into a cage perhaps, from which he must learn to escape in order to secure the food which he sees and smells just outside. In any event, the promptness and certainty with which he is fed is made contingent upon his quickness and intelligence in solving some simple puzzle about the fastenings of his cage.

The second is instinct of one kind or another. It may be exploratory curiosity; it may be

general disposition to get out of captivity; it may be the sex impulse; it may be parental instinct leading the mother to her young, or conversely the impulse of the young to return to the mother, or to the nest. In any event, the satisfaction of the impulse is made to depend, as in the previous case, upon the solving of some simple problem.

The third is punishment. Clearly this cannot always be used to furnish an incentive in the first instance. But it can be used very successfully to guide the direction and rate of learning. Suppose, for instance, that an animal is being taught to distinguish between two possible pathways. If entrance on one of these paths is always accompanied by a slight electrical shock, the animal may be induced to choose the other path more quickly than if undisturbed, and with no other penalty attaching to a wrong choice than the necessity to go back the way he came in order to get his food.

Certain of the earlier experiments on animals have been performed with the creatures in so furious a state of hunger as to leave some

question in the mind as to whether under such conditions they could possibly display their normal mental capacities. No doubt there was occasionally ground for criticism on this score, but the same kind of experiments have often been repeated under circumstances much more favorable to the animals, so that we may now feel some confidence that we really know not a little that is fundamental about the mental processes of a number of creatures. It is, of course, to be frankly admitted that unless violent hunger be employed, it is difficult to secure an incentive which shall operate continuously, or with any approach to constancy at different times.

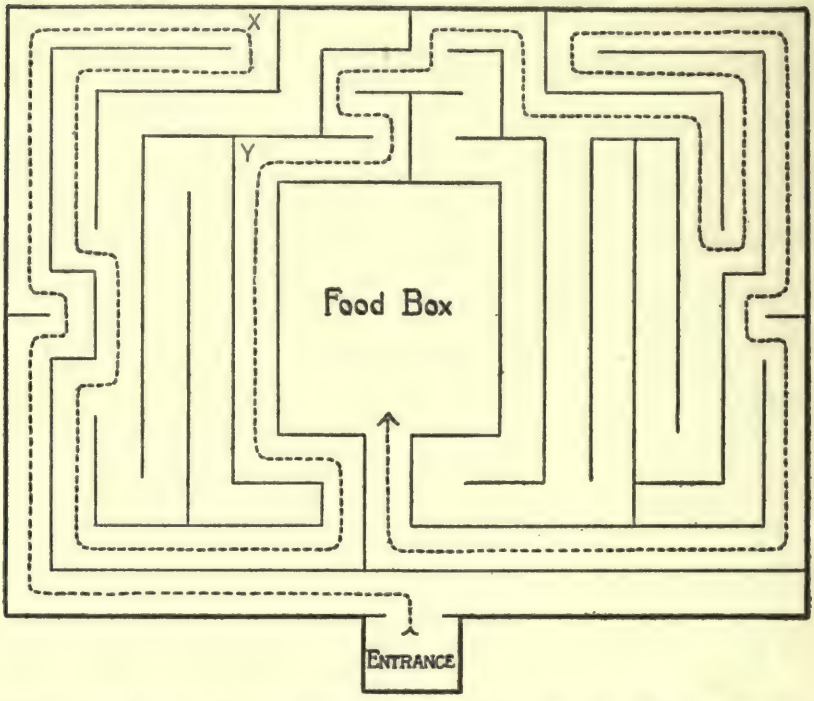
We now have some interesting experiments at hand which indicate that, under certain conditions at least, learning is expedited in the most effective way by combining rewards for success [e.g., food] with mild punishments for failure. This procedure renders the animals peculiarly alert, and if the punishment be not too severe, so that shock and terror are avoided, the animals become much more careful and much more solicitous to achieve

the desired result quickly. These facts suggest that possibly the practice of an earlier generation of schoolmen was sounder than of late it has been generally believed to be. Certainly the combination of reward and punishment may lay claim to practical merits of a high order, whatever its moral aspects.

A description of a few of these animal experiments may serve to lend point to these somewhat general statements. I shall choose, first, certain studies carried on by Prof. John B. Watson in my own laboratory on white rats.

As every one knows, the rat is quite a wanderer and highly skilful in making his way about in the tortuous passages existing in the walls of houses. He is generally reported to be nocturnal in his habits and to have peculiarly keen vision. Assuming that these characteristics are justly attributed to him, it would appear to be a fair and altogether normal problem to offer him, were we to construct a complex system of pathways, one and only one of which would lead him from his cage to his food. The Hampton

Court Maze offers precisely such a device, and accordingly this was chosen. A model was built, the ground plan of which appears in the accompanying figure. The run ways, four inches in width, are constructed of thin



Ground plan of the Hampton Court Maze as used in experiments upon animal intelligence. The dotted line indicates the true path.

wood, the edges being some four inches high, and the entire path about forty-three feet in length. Inspection of the drawing will show that there are numerous blind alleys and false leads.

This apparatus, like many others used in the study of animals, aims at the determination of two sets of facts: first, by means of what senses does the rat learn to make his way from one end to the other; and second, in what way does he make use of his mental material, regardless of the special sense avenue by which he gains it? For instance, is he able after once discovering the path to follow it again at will without error? Does he follow any plan in learning the path, or is the process accidental? The maze gives fairly unequivocal answers to both these lines of inquiries.

There is no evidence of anything essentially systematic or orderly about the behavior of the animals. Success is, in the first instance, contingent upon restless and untiring activity. In the course of the first successful attempt, the animal is likely to have entered every passage dozens of times. The following ten trials always show a marked decrease in the time consumed, and by the fifteenth or twentieth trial most animals will have the pathway learned, so that the time

occupied is simply that required to run at top speed from one end to the other of the maze. This is, perhaps, the outcome most persons would anticipate. But the evidence concerning the senses employed in the process is by no means in keeping with ordinary impressions.

A full account of the details of the experiments would require more time than we can give. But a few brief statements may be made, indicative of the situation.

In the first place, it seems quite clear that vision is of no great importance in learning this maze, because (1) animals learn to run it as promptly, and, after learning it, run it as rapidly, in pitch darkness as in daylight; (2) blind animals learn it substantially as quickly and as well as seeing animals; (3) if a barrier be placed across the pathway after an animal has learned to run it, he charges full tilt into the obstacle. If the path be lengthened or shortened an inch or two as at X or Y (certain of our mazes are constructed so as to permit changes of this kind), the animal will make the turn as it formerly did, regardless of what it can see,

will either turn too soon and bump its head against the wall, or overrun the opening and try to turn where there is now no aperture, again bumping its head violently.

This is not tantamount to saying that rats make no use of their eyes. We know from other experiments that they are used for some purposes. But it does mean that the eyes are of much less general use to this animal than common opinion would suppose, and that in this special situation they are of the slightest possible value.

Similarly, it has been proven that they do not learn the maze by "tracking," through the sense of smell. The evidence is both positive and negative. A rat will not learn the maze more quickly because a trained rat, whose pathway might be followed, has just been allowed to run over the true path. Nor are rats which have been operatively deprived of the sense of smell at any disadvantage when compared with normal animals. They learn as quickly and run as rapidly.

By means of similar experiments all the senses have been ruled out, one by one, except

the sensations of movement which come from the skin, the joints, the muscles, the tendons, and, perhaps, from the semi-circular canals in the ears. It thus appears probable that the rat learns the maze in much the same way that we learn to go downstairs in the dark, by the "feel," as we say.

We have made some interesting experiments on children and adults in this same kind of maze, blindfolding the reagents in order to put them more nearly on an equality with the rats to whom we knew vision to be of little value in this task. They did, on the whole, rather less well than the rats, although some of them, after their first success, cut down the time for the next success, rather more rapidly than the rats. The problem is not one which permits itself to be intellectualized very readily, and in consequence the "try, try again" method, known in comparative psychology as the "trial and error method," is the only one available. The evidence thus far in hand indicates that this is the all but universal method employed by animals in problem solving.

Tests of this character show that rats certainly have a form of memory, whether it be like human memory or not. They can learn a highly complex reaction in as few trials as humans, and we have tests showing that even without practice, they will remember the pathway with considerable accuracy for weeks on end. They must be accredited, then, with states of consciousness, provided their nervous system and general behavior also indicate this, which they do.

In a manner sufficiently like the maze experiments to render detailed description unnecessary, many animals have been studied with a view to determining just what senses they make use of and in what ways. Color vision has often been thus investigated. Unfortunately, owing to blunders in the technique, many of the results are perfectly worthless. Let us suppose that an animal is fed under such conditions that his food may be found beside any one of three differently colored cards. If it be always placed under a red card, we may then determine by moving the color from test to test

whether the animal can distinguish red from other colors.

At first sight, this seems to be a very simple test to make. In point of fact, for several reasons, of which only one will be mentioned, it is far from easy. Colors not only differ in hue, they also differ in brightness, and we now know that animals may respond to differences in brightness when they are probably insensitive to many of the differences in hue. Our rats have refused time after time to give the slightest response to colors.

These facts are mentioned by way of suggesting how complex the facts are with which we deal in attempting to control our conditions, even when they appear quite simple. In this special instance we have a graphic warning against a common kind of error, i.e., the assumption that if an animal possess sense organs closely resembling those of man, it may be inferred that the use of the organ and its sensitiveness is essentially like that of man. The rat's eye closely resembles the human eye to casual inspection. The use made of it is radically different. Evidently, eter-

nal vigilance backed by wide and accurate knowledge, is a prime essential in work of this kind.

Many interesting experiments have been made on the susceptibility to modification in instincts, of which a single instance may be mentioned.

As is well known, the young of birds tend to imitate the notes of the parent birds, just as babies imitate their human mothers. Mr. E. Conradi took advantage of this trait, and turned over a brood of young English sparrows to the tutelage of some enterprising canaries, who straightway taught them the note of the latter species. It seems a pity that Mr. Conradi did not go further, and perhaps with the help of a Burbank or a DeVries, secure these monumental pests the remaining graces of the canaries, both moral and physical. Thus we might solve one of the vexatious problems of song-bird preservation.

The subject of imitation in animals has always enlisted a wide public interest, and this has been reflected in the interest of animal psychologists. Monkeys, in particular,

have ordinarily been supposed to be highly imitative, and any one casually watching the behavior of the common domestic animals, is likely to gain the impression that they imitate one another very extensively.

The more this matter has been studied in an experimental manner, the more questionable it has become whether animals really can and do imitate one another to any such extent as has been commonly supposed. Monkeys, it should be added, are generally credited with the capacity to imitate human beings as well as one another. One great difficulty with the conclusive proof of imitation in animals is found in the fact that so many of the things which they do, by virtue of which observers credit them with imitation, are essentially instinctive and are done by all the members of the species under the appropriate conditions. Thus the little chicken following about after the parent hen may be credited by the unsophisticated observer with the attempt to imitate the pecking movement of the mother, whereas in point of fact these movements are instinctive

in the chick and will be performed quite independent of any exemplar.

The observers of monkeys are radically at outs with one another as to the extent to which these animals really imitate, some of them having failed utterly to demonstrate to their own satisfaction the presence of any non-instinctive imitative acts, others alleging the presence of such acts in great profusion. It seems on the whole distinctly probable that thorough-going imitation is less frequent than has generally been supposed, although there is no reason for any sweeping denial of its existence.

In this connection an interesting question comes up in the training of animals, namely, the issue as to the effect of "putting an animal through an act" which it is desired to teach him. Thus, in training cats or dogs to perform certain tricks, the effort is often made to show the animal what is desired by putting him in the posture required. Evidently this involves in a certain sense the capacity of imitation. At least the procedure is based on the expectation that the

animal will, in his own behavior, imitate the act which he has been forcibly put through.

Here again, as in the case of the larger problem of imitation, there is considerable diversity of experience. Certain observers report complete failure in the employment of the method. Others are quite certain that it is beneficial. It seems not improbable that a good deal of this diversity may depend upon the idiosyncrasies of the particular animals worked with, and upon the differences in the particular acts to be learned. In teaching a dog to sit up on his hind legs, one might reasonably expect that to put the animal in this position, and then follow the performance with a reward of some kind, would be vastly more efficient than the employment of a similar process in the case of training the animal to discriminate between two colors. In any event, the experts at present disagree, and the rest of us must, therefore, bide our time.

In the writings of a generation ago, as in all those which had gone before, we find the contrast constantly emphasized between In-

stinct and Reason, as though these two forces were personalized and set in conflict, the one against the other. Nowadays, we hear little of this, and instead we make a distinction between behavior which is innate and inherited, and that which is acquired. Nevertheless, under the new terminology, we meet in experimental literature with the old interest and the old desire to test the extent to which animals can be shown to use processes of inference like those of human beings. Learned treatises have been devoted to this subject, and endless anecdotes from zoölogical gardens, and from owners of pet or domestic animals, are brought together and offered as evidence. Animals, like "Clever Hans" and "Bozzie," may for months and even years deceive people into believing that they possess human powers of computation. Clearly, it is at this time out of the question to examine all this evidence with care. But it is certainly not going too far to say that the more completely each case is scrutinized, the more improbable does it appear that animals in general think in the way human beings

think. It is, of course, by no means impossible that occasionally some gifted animals should use essentially the same thought processes that we do. Their brains are in many cases perfectly well equipped for it, so far as we know. But if one make due allowance for previous experience, gained no one knows how, the authentic cases of animal behavior which savor strongly of human types of inference, of reasoning from cause to effect, are few and very far between.

Even if one grant for the sake of argument that animals may use human forms of inference, it would still remain true that, in degree, the gap between man and the animals is prodigious, wholly out of proportion to anything we now know of the differences in brain structure.

Meantime, we have before us as a most interesting set of problems, not only all the details of such questions as have been already discussed, but the determination of what I have elsewhere called the *mental patterns* of the different genera and species of the animal world. The differences in their bodily

form, in their sensitivity to one or another kind of stimulus — e.g., smell or sight, the differences in their general habits and behavior, must indicate very different mental patterns. The consciousness of the hunting dog must be very widely divergent from that of the rat, and both must vary radically from that of the eagle or the trout. We shall hardly secure any conception of mental evolution that warrants serious consideration, until we are in a position to furnish a modicum of information upon this problem.

As was intimated at the beginning of the lecture, two divergent conceptions are at present entertained concerning the distribution of consciousness throughout the organic world. One of these maintains that all forms of life, vegetable as well as animal, possess consciousness of one kind or another. The view is even extended by certain extremists to take in the whole universe, on the ground that in the deepest and truest sense, everything enjoys life. The other conception holds that consciousness is a property of only a limited group of organisms. The line dividing the

possessors of consciousness from those alleged to be devoid of it is drawn at different levels by different authorities, depending on their interpretation of the behavior of the animals in question. Thus, certain authorities would unhesitatingly deny mentality to the amœba, whereas other equally eminent scientists would accredit this creature with the possession of a primitive form of consciousness.

The discussions of the last few pages will have missed their mark, if the reader does not realize how futile must be at present all effort at dogmatic pronouncement on this issue. There may well be forms of consciousness so discrepant from that of human beings as to require years of study in order to make clear their composition and methods of operation. Thanks to experimental procedure, we are already in a position to determine with much certainty whether a given animal possesses consciousness closely resembling the human type. But the delineation, and even the intelligent and confident recognition, of other types is still in the future.

LECTURE VIII

GENERAL GENETIC PSYCHOLOGY

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THANKS to Darwin, the genius of our own time is wont to regard all problems from the standpoint of growth and evolution. This is as true in psychology as it is in botany or zoölogy, in geology or astronomy. The mind of to-day we firmly believe to be child to the mind of yesterday, and the direct lineal descendant of those earliest forms of mentality, whose prototypes are presumably preserved for us in the lowest embodiments of plant and animal life. Having been nurtured on a diet of this kind, it is natural that the psychologist should scrutinize all possible lines of evidence for the determination of the various stages through which mental evolution has passed.

When we contrast the intelligence of animals with the intelligence of man, we find differences so vast as seriously to stagger

belief in the fundamental identity of the process by means of which the two have been produced. Attention was directed to this matter in the last lecture. Nevertheless, despite the magnitude of the discrepancy between the highest achievements of the animals and those of the human mind, the conviction is still unshaken that the mind of man is but the natural outgrowth of the animal consciousness. This belief is strongly supported by the arguments from physical structure, for it is perfectly clear that the pattern on which the animal nervous system has been built up is identical with that which we find in man. There are many differences of detail, and there are differences in complexity of development; but fundamentally, the pattern of the nervous system of the higher vertebrates is that of man himself.

It is a familiar doctrine, widely disseminated by Herbert Spencer and his disciples, that there are very essential differences between the mind of savage man and the mind of his civilized contemporary. It is often alleged that savages are lacking in this and

that mental power, and that they are like children in their mental processes, flighty, unstable, easily diverted, easily angered, easily amused, easily moved to wrath and malice. Coupled with this theory is a very common conviction that savages possess certain points of intellectual superiority, as was intimated at an earlier point in our considerations. They are believed to have keener senses than civilized man — to see further, to hear at greater distances, to detect odors to which the normal civilized individual is oblivious. The savage is alleged to be weak in reasoning powers, often to be incapable of counting beyond a few digits, to be helpless in the face of simple arithmetical problems, etc.

It may well be questioned whether these conceptions of savage intelligence do not rest on somewhat specious evidence. It is quite true that the savage does not reason as does the civilized man about those problems which appear under conditions of civilization. It is also true that he does not attend to the paraphernalia of civilization. It is true, too, that upon his native heath, amid his native

forests, and upon the waters which he knows, his senses serve him in a manner entirely beyond the power of the victim of civilization. But it may still be doubted whether the inferences often based upon these unquestioned facts are fundamentally sound. A number of them we may certainly characterize as false. It is at least an open question regarding the others. The senses of the savage are not more sensitive than those of the average civilized man. What is more sensitive is the perceptive capacity which has been trained by long experience. Not only are the experiments of modern psychology substantially conclusive in this matter; the evidence of early Indian days in North America tells us a similar story, in its unquestioned record of white scouts and trappers, whose senses outstripped in keenness, or at least proved the peers of, the most skilful savages.

To allege an incapacity to reason because reason is not directed in certain preconceived channels and does not concern itself with certain conventional subjects, is wholly to

misunderstand the essence of the reasoning process. Many an individual, whose mental capacities are of a very high order, may, either for lack of training or for lack of interest, evince an incapacity for mathematical problems of a certain sort, and still possess a mind abundantly able to deal with materials of another order. Consequently to assume that, because a certain race of savages makes use of only the most rudimentary arithmetical processes, they therefore possess reasoning powers of a negligible kind, is to form an inference entirely unwarranted by the facts offered. Tested by other criteria, they may prove themselves eminently efficient. The inference would be quite as fallacious as that contrary one, denying to civilized man the savage's keenness of sense, because, under the conditions of savage life, he cannot cope with primitive man. The fact is that both individuals are being tested under conditions so foreign to their training, as to render a just judgment of their latent or original capacities extremely difficult and precarious.

Nevertheless, it may be said that the intelligence of the savage is necessarily to be ranked as far inferior to that of the civilized man, otherwise he would have evolved the ability to handle the problems of this more sophisticated kind. The evidence on this matter is hard to gain in satisfactory form, but such as it is, it would seem to indicate that up to a certain point at least, intelligence develops only in response to crucial and critical demands. If the group life of the savage demanded arithmetical processes of an elaborate kind, it seems likely that these would have developed. Certainly there is no insuperable difficulty in teaching these principles to the children of savage parents, providing the attempt is made at a sufficiently early period.

The statement that savages are incapable of prolonged attention certainly seems quite unjust, for in hunting and in many of their warlike campaigns, attention is sustained at a high pitch for considerable lengths of time. Possibly this all amounts to saying that savages possess potentially the capacities sup-

posedly inherent in civilized peoples. Their actual achievements are dependent upon the conditions of life in which they find themselves.

Undoubtedly there is an insistent popular tendency to over-estimate the daily intellectual accomplishments of the average civilized man. Few persons appreciate how completely most of us are creatures of habit, and how infrequently any of us are guilty of processes which could, by any remote stretch of veracity, be regarded as those of abstruse reasoning. We think in concrete and often ineffective ways. It takes us a long time to solve a very simple problem, and the solution when gained is often of a more or less accidental character. In the main, we do not think in straight lines; we do not reason directly from cause to effect, unless we be extremely familiar with the facts in the case; we do not reason in syllogisms; and we are guilty of every possible kind of fallacy in our thought. A select few of us, highly gifted, have elaborated various forms of technique for thinking, which the

rest of us appropriate, and the credit for which, as intellectual achievements, we forthwith credit to our own account. Many men can successfully solve a problem in long division, whose minds would be hopelessly incompetent to work out the method for themselves. To credit such a person with a high order of intelligence, in contrast with the savage, simply because of his ability to do things of this kind, is to work a double wrong in the flattery of the one and the depreciation of the other.

Again, it is often alleged that civilized man is vastly superior because of his inventiveness. Such an assertion can only be made by one who is entirely devoid of information and imagination adequate to furnish correct historical perspective. The inventions of the modern world, whose profusion bids fair to overwhelm us, are not so much indications of a superior order of intelligence, as they are incidents in the progressive application of a certain technique to the solution of the multifold problems offered by our complex conditions of life. Certainly those writers

are in the right who doubt whether any more intrinsically marvellous invention ever was made than that of the bow and arrow. No one who lives intimately among primitive peoples can question for a moment the prodigious ingenuity of many of their devices for meeting the exigencies of every-day life. The methods of making boats, of lifting water, of trapping fish and game — these and dozens of other examples will at once suggest themselves to the mind. Because of the crudity of the tools with which most of these inventions have been executed, the results appear to the critical civilized eye uncouth and imperfect in comparison with the machine-made products of the American and European factories. Undoubtedly they are vastly inferior from a practical point of view; but as evidences of underlying intelligence and ingenuity they may safely invite comparison with the great mass of scientific inventions.

Civilized man, as has been intimated several times, has learned to systematize and objectify his technique, so that by pursuing a given method he may secure a great variety

of results. For example, in the scientific investigation of animal life, one and the same method may serve to determine facts about the behavior and the life history of a considerable number of quite different animal species. The facts so gathered may previously have been quite unknown, and their ascertainment constitutes in the most definite way a new discovery. But the intellectual processes of the scientist who makes the discovery may have been of the most rudimentary kind. His task is the repeated and painstaking application to new ranges of phenomena, of a method already elaborated. Such is the nature of many theses of doctors of philosophy. To be sure, the evolution of the method itself may have involved mental powers of a much higher order, and have called into play inventiveness of a much higher kind, although many inventions and discoveries have been notoriously accidental. Nevertheless, the character of the operation by which such a method or discovery is made continuously effective may apparently be no different in kind from that which leads the

African savage to devise an ingenious variant upon some form of trap.

The modern sciences, from the practical point of view, consist of enormous quantities of systematized information ready to hand for use in any of scores of ways. Much of this information may be carried in mind with no undue strain upon the powers of memory, and its employment may call for few intellectual operations more complex than those required to perform an extended arithmetical computation. By virtue of his ability to make use of this engine of civilization, the scientist is often credited with an intellectual acumen which is in reality the gift of science itself, and of its accumulated treasures. From the standpoint of civilized life, no doubt the organized material of knowledge enables man to cope vastly better with the circumstances of his day; but it is not to be forgotten that his competency is distinctly relative to the conditions under which he lives. Throw him alone into the midst of the African jungle, and he will perish miserably, where the savage would thrive and make his way. Nor would

his failure to survive be due solely to his physical unfitness to withstand the rigors of climate. It would be quite as truly attributable to the inadequacy of his kinds of knowledge and his forms of skill to meet the demands created by such immediate contact with the facts of nature.

Even on the emotional side it may well be questioned whether there is any so radical difference between savage and civilized human nature as has generally been alleged. Savages are often said to be much more excitable than civilized men, but nothing could surpass the stolidity of the North American Indian under conditions which would harrow the soul of his civilized brother, and the Neapolitan street gamin is hardly to be accused of emotional reserve. Again, it is asserted that savages cherish malice in a way unknown to 'culture' peoples. That savage conceptions of right and wrong justify expressions of malice which are impossibly revolting to civilized men, cannot be questioned. But if the history, poetry, and fiction of civilized peoples afford any indication, the cherishing of malice over

long periods of years, and its expression in despicable ways tolerated by society, are by no means traits which have been sloughed off in the passage from barbarism to civilization.

The fact seems to be that there are as marked distinctions between different races of savages in the matter of emotional expression, as there are between savages on the one hand and civilized peoples on the other. Many of the African tribes are vivacious, affable, and full of humor and high spirits. The American Indian, on the other hand, is generally subdued and reserved in his demeanor. The one line of demarcation which seems to afford any consistent differentiation is one which is based on a recognition of the fact that the objects which evoke the emotions of savages are not those which impress civilized peoples. The entire furniture of the mind is different in the two cases. The exigencies of life are felt at different points, traditions and customs are at variance, and the result is that one group responds with anger or fear to stimulations which affect the other group pleasurably or not at all.

Nowhere is this difference more evident than in the case of property. For the savage, the object of prime importance in his daily life may be his kayak, his spear, or his bow and arrow. For the civilized man, all the emotions gathered about those articles in the savage breast are transferred to stocks and bonds and the possession of franchises — objects which have no possible meaning to the savage. It has proved no small part of the perplexity of explorers dealing with primitive peoples far removed from the pale of civilization, to decide on the proper merchandise by means of which to procure through barter the possessions or the services of such tribes. The objects taken for such expeditions are oftentimes wholly ridiculous from the point of view of the civilized man. That one should be able to buy a month's hard service for half a dozen glass beads and a couple of yards of red calico has its only explanation in a diversity of economic conditions and of mental desires such as baffle the powers of prediction.

It is not possible to allege that the view

we have been entertaining concerning the essential similarity in fundamental traits between the civilized and the barbaric mind is definitely proved. We simply maintain that the contrary view which has been generally believed is, in its extreme form at least, certainly untrue, and that conceptions such as have been advanced in the preceding statements are quite within the bounds of probability. Accepting this position provisionally, the question at once suggests itself as to the nature of the mental evolution which has occurred in the transition from barbarism to civilized life.

Modern research has tended to foster the view that savage and civilized mind are intrinsically one and the same; that their apparent variations are due to the effort to judge them each in terms of the life conditions of the other; that when they are put upon a plane of equality, they show characteristics of the most strikingly similar kind; and that the apparent superiority of the civilized mind has to do with the development and appropriation of the technique of logical and

scientific method, by means of which the individual is placed in possession of a wide range of information applicable to the problems of life. It is certainly doubtful whether the native intellectual capacities of savage and civilized children differ radically in any respect. Certainly no test of this has ever conclusively proved the affirmative. Wherever so-called inferior peoples have been put in competition with superior races, namely, races further along in the process of civilization, the inferior one has been subjected to social and economic disabilities which have effectively prevented any fair test. The student who has learned to solve simple equations is in a position to solve quadratic equations much more readily than one who attempts the problem without the advantage of the preceding discipline. But to judge the second person inferior to the first in native mental capacity would evidently be illogical. He may be superior or inferior or equal. The chances are that he owes his practical advantage to the more or less accidental achievement of some of his forbears, who have

handed down to him the information which they themselves have gleaned.

In all these processes it must be understood how tremendously important a part is played by the preservation of the wisdom and experience of a race in written form. It may well be questioned whether the larger part of the difference between cultivated and barbarous peoples is not to be connected with the facility with which the former have embodied their knowledge in written form. Certainly the introduction of printing has always been followed by a radical change in social conditions. No adequate estimate has ever been made of the modifications in the mind of the people brought about by the modern newspaper. Yet nothing is more certain than the birth of a new type of social consciousness as a result of the prompt daily diffusion among the rank and file of the population of information concerning all parts of the world and all ranges of experience. The ditch digger of to-day may well know more of geography and of world-politics than the gentry of a century ago.

To determine what makes a race progress in the direction of civilization and to determine what factors fix the pace at which progress occurs is one of the most difficult problems which can be set the historian, and one whose solution has been most imperfectly attained. That there are differences marking off the practical efficiency of races as truly as they mark off from one another individuals within these races is entirely beyond dispute. The point which we have been urging is simply that in native mental capacity there is no such universal divergence as is commonly supposed. We believe that the differing measure of success is due largely to motives which lie outside the intrinsic mental abilities of the rank and file of the race; at least, we believe this to be the fact so far as concerns savages as a whole in contrast to civilized peoples as a whole. Disease, malnutrition, and climatic severity may serve to undermine the vitality of any particular unit, but this is as true of civilized peoples as it is of barbarians. Witness the poor mountain whites in our southern Alleghanies.

The anthropologists have been wont to urge that there is a more basic difference than we have admitted between savage and civilized minds, correlated with the alleged smaller size of the savage brain. This matter has already been referred to in our previous discussions, and it will be recalled that evidence was presented to show that intelligence bears no direct relation to the absolute size of the brain. No examinations which have been made upon savage brains would justify the inference that in any general way they are less highly organized than the brains of civilized peoples. Probably the brain of a Helmholtz would differ more in the minuteness of its internal organization from the brain of an Italian day-laborer, than would the average brain of any of the important groups of savage peoples now known in comparison with the average European brain. We must revert, then, to the belief that mental evolution in man consists less in the accidental possession of higher native capacity, and more in the better organization and the mastery of the technique of knowledge and thought.

When we contrast the human child with the young of other animals, and with the mature man, we secure another interesting method of approach to our topic. It was shown in an earlier chapter how the child comes into the world equipped with an elaborate set of hereditary capacities, by means of which to accommodate himself to the more immediate demands of his surroundings. His reflex, instinctive, and automatized activities, together with parental nurture, serve to carry him through the longest period of relative helplessness known in the young of any creature. This extended period of infancy, while it is prolific in dangers for him, contains within it his highest promise of growth and development, because it means that he is born with a more plastic nervous system than any other creature — one which can be modified more readily and can be induced to react with a greater profusion of responses than that possessed by any other living form. The helplessness of infancy, then, is but another name for the possibility of growth. This growth is not

solely a physical matter. It is quite as much mental, and, indeed, the appearance and increase of power over our physical activities is distinctly and unquestionably a matter of growth in mental capacity. Attention has been called to the fact that the human brain reaches its maximum development in point of external size at about the seventh year. After that time the growth is almost wholly one of internal organization.

It has also been shown how the child, through the media of language, of play, and of imitation, comes into its heritage of moral, spiritual, and institutional human principles. On these institutions and on his physical surroundings, he reacts by means of his intelligence and so forges his own character. He gets command of his muscles and of the various media of expression early in infancy. By the end of his fifteenth year he has secured the great mass of all his working ideas. During adolescence he completes his process of socialization, and shortly thereafter life is likely to settle down for him and determine in what channels the remainder of his experi-

ence is to flow. Intellectual development is likely to go on through the first ten or fifteen years of this last stage in the case of persons whose occupations require a more active employment of the mind. Those devoted to the grinding routine of purely manual labor are likely to cease from intellectual growth at an earlier period. In any case, be it early or late, there comes a time when growth is substantially at a standstill, when both physically and mentally the individual is living upon his stored-up capital, and running along, year in and year out, with neither appreciable deficit nor profit. Then comes the period of retrogression and disintegration; attention becomes less forceful and vigorous, memory becomes more treacherous, and, in general, those traits which were taken on last during the period of growth begin to give way and leave behind those which were earliest gained and those which were most nearly instinctive. Nowhere, except perhaps in memory, is this state of affairs more clearly revealed than in the case of the emotions. The so-called childishness of old

people is nothing more nor less than the effect observed when the emotions of maturity are discarded and only those which are naturally appropriate to early childhood remain.

This life history of the individual suggests in a striking manner the truth of our conception developed earlier in the lecture. A race is made up of individuals who, for the most part, do not progress in a consistent and unbroken way from the innocency of infancy to higher and higher intellectual accomplishments. They reach their zenith at a relatively early period and then either remain stationary or enter upon a decline. The group as a whole, on the other hand, if it progresses, takes up into itself in each succeeding generation something of the best accomplishments of each individual during the period of his maximum efficiency. This is true, perhaps, only in a limited degree, so far as concerns the contributions from the rank and file of common folk. It is, however, markedly true as regards the achievements of the great scientist, the great artist, the great moral or religious leader.

Retrospect

In the few concluding moments we may profitably attempt to look back over the ground which we have traversed in our effort to secure a bird's-eye view of the field of modern psychology. What have been its salient features, what conceptions has it brought us of the mind?

As pure science, psychology evidently cherishes two principal aims. The one leads to the search for the most detailed kind of knowledge concerning the elementary materials of which the mind is composed, their forms of combination, and the laws of conscious activity. This aim is embodied in the introspective and experimental forms of the science, and includes in its undertakings the programmes of morbid psychology, of physiological psychology, and even in a sense that of animal psychology. Over against this stands the effort to delineate in broader lines the large aspects of mental evolution and to describe and interpret the incarnation of mind in social institutions and practices

of all sorts. Here belong all the studies of social and racial psychology, the investigations of religion and art and myth and language, which disclose the mental motives occasioning all these expressions, and reveal the mental states of the persons who participate in them. Evidently animal psychology has its contribution to make to this wing, too, of the psychological movement.

Distinguished from this department of pure science, whose shibboleth is knowledge for the sake of knowledge, truth for truth's sake, is the programme of applied psychology, which we have felt obliged to pass with only meagre comment. We have attempted merely to indicate the directions in which advance is to be expected. There are but few fields at present in which the technique for the application of psychology to practice has been sufficiently perfected to justify a serious claim to immediate usefulness. Education is one of these, and there can be no possible doubt that we shall find ourselves, year by year, in possession of increasing stores of solid and valuable educational information, as a result of the

systematic employment of psychological methods of investigation.

The great danger in all this realm of applied psychology is that over-zealous and indiscreet pretensions may be raised. The almost certain failure promptly to make good these pretensions is likely to bring a wholly unwarranted and unfortunate discredit on the real possibilities of the case. Many scientific appliances of high value have required literally generations for their satisfactory completion, and it is wholly improbable that the more difficult applications of psychology are to be accomplished in the twinkling of an eye.

No doubt, many readers have wondered that so little has been said of a higher type of application of psychology. Has it no word to offer as to the fate of the mind after physical death? Has it no well-established principles to put at the disposal of the moral and religious teacher? Has it no eye for the larger and more lasting interests of man? Is it wholly bound down to the pettiness of mere fact-mongering?

These are fair questions and warrant a fair answer, however brief it must be.

The answer must start with a reminder that modern psychology is primarily a science, and as such is jealous to guard her skirts from the contamination of problems, however fateful, which do not immediately concern the field she has pre-empted as her own, and especially such as do not lend themselves to solution by an appeal to verifiable fact. Wherever she has been deeply interested in the application of her teachings, it has been with the understanding that these applications should be made where their results might be subjected to concrete, palpable tests. Even when she has invaded fields like those of spiritism and telepathy, it has been with the intention to determine whether or not scientific methods are valid in those ranges of human inquiry, and, if so, what they disclose.

In general it may be said that the teacher of religion and morals has much to learn, not only from the psychological studies of religious experience, but also from the direct

analysis of ordinary mental life. An accurate knowledge of the facts of instinct, of the principles of emotion, of the mechanism of voluntary control, of the function of imagination, and especially a just understanding of the normal processes of mental growth and of the more familiar forms of mental aberration, — these can only serve to illuminate and rationalize any educational methods, whether directed particularly to moral and religious ends, or to those of a more narrowly secular character. Certain it is that many brutally erroneous misconceptions of religion and morals could never have gained a hearing, much less a general acceptance, save for ignorance of the most crass kind concerning the order of nature in the unfolding of the mind. Many acts which were in essence but the harmless and natural budding of healthy human nature have been counted as deadly sin, and suppressed and hidden away, only to come to light again in morbid and pathological ways. The sexual history of many persons affords the most painful testimony to such errors.

Nor can there be any question that religious leadership must be made the wiser and saner and socially more effective by a knowledge of the typical forms of religious experience characteristic of primitive peoples, of representatives of the great world religions, of the saints and prophets of all ages. Nor can such leadership disregard a psychological knowledge of the well-springs of religious feeling in ordinary human nature, and an adequate acquaintance with the pathology of the religious life.

If one turn to the philosophical aspects of ethics, in distinction from its applications in the work of moral instruction, one finds that recourse is had to the psychologist for a large part of the foundations on which the ethical superstructure rests. The early portions of any contemporary treatise on ethics are almost certain to be devoted purely and simply to the psychology of conduct. To all intents and purposes this material is borrowed outright from the psychologist. It deals with impulse and instinct, with pleasure and pain, with emotion and desire, with imagina-

tion and reason in their several relations to the development of voluntary control and the formation of character which is imbedded in moral habits.

The same thing is found when we turn to philosophical æsthetics. At the very outset attention is directed to the psychological processes involved in the creation of the work of art on the one hand, and in its appreciation on the other. The social and mental circumstances out of which the arts have sprung are studied, and at every point an effort is made to fortify theory by the most penetrating observations of conscious experience, in all of which the psychologist is laid under contribution. Logic and the other branches of philosophy all reveal a like dependence upon psychology, so that no charge can be established here of failure on the part of the psychologist to put his wares at the disposal of those who need them.

The problem of life after death, the most insistent problem perhaps that we know, is one upon which psychology as such has no light to throw. Individual psychologists

have gained evidence, which they regard as conclusive, that the human spirit survives death and may communicate with the living. Such evidence is based upon the spiritistic phenomena to which reference was made in an earlier lecture. But this evidence has never commanded the general assent of psychologists, and undoubtedly the prevalent attitude is one of uncertainty. On the other hand, no more than any other science does psychology bring evidence which forbids hope or faith in its craving to cross the stream that severs life from death. The problem seems to most psychologists not of a character to be subjected to empirical proof, and until such proof is available the question may be excluded from those fairly to be asked of a science.

As to the mind itself, at whose fuller understanding all these branches of psychological science are aimed, we can add but little. Frankly recognizing the limitation of our survey, we have attempted to sound the depths separating the mind of man from that of the beasts. We have traced the

development of human intelligence from the zero point of infancy to the full capacity of the adult. We have considered the evolution of the mind from its barbarian to its civilized forms. We have dwelt upon the astounding variety of mental types, and we have looked into many of the species of the mentally aberrant. We have scrutinized the institutions which the mind has created and amid which it grows.

Little by little the veil of mystery falls away, now this fact and now that dropping into its natural place as an intelligible part of the universe of mind. And still the greatest mystery remains in that mind exists at all, a being transcending the limitations of time and space, encompassing within itself the uttermost ranges of knowledge, the heights and depths of feeling, the alpha and omega of personality. We may well bow our heads with Kant before the starry firmament above and the moral law within. But the moral law is only one among the many marvels of our psychic frame, which well deserves in all its parts the homage of our wonder.

APPENDIX

The following brief list of references is presented for the assistance of readers who may wish to pursue further the study of the subjects discussed in the preceding lectures.

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